

“An Empirical and Institutional Examination of Post-Crisis Capital Flows : Thailand Case”

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ABSTRACT*

In this paper, we developed and estimated a model of the Thai firm during the crisis. Our results indicate that firms with the highest debt-equity ratios suffered the steepest declines in earnings per share during the crisis from the financial distressed costs. We take this result as strong evidence for the credit channel. Surprisingly, firms with the largest market capitalizations suffered more than the smaller firms owing to their capital structure and financial leverage effect. We also witness *asymmetric impact* between the industries – exporters, importers and intermediate. We take this as evidence of different scale-effects on different industries, a feature that we do not explicitly model. In other words, the production effect is more pronouncing in import related industries than the export oriented one. Note that firms that import intermediate goods also suffered greatly from the crisis from both credit and production channels. Taken together, our overall results indicate that the crisis damaged the earnings per share of firms more on credit channels than the production channels. There exists a peculiar tradeoff between benefits from currency devaluation to promote exports and severe adverse impact on both credit channel and asymmetric impact on production channel.

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1. Introduction.

Currency crises have traditionally been viewed as the fault of emerging market governments. Traditional economic models blame emerging market governments for running unsustainably high fiscal and current account deficits, keeping real exchange rates overvalued, and depleting foreign exchange reserves. Of course, there are other forms of government failure. In the case of East Asian countries, there is some evidence that the deposit taking financial intermediaries in these countries, although implicitly insured by their governments, and financial market were not well regulated. This lack of regulation led to moral hazard in lending by banks to corporations, resulting in high problem loans, a rise in risk, an outflow of capital, and finally, a currency collapse (see Dekle and Kletzer, 2001, for a model). Without denying that poor financial regulation was an important contributor to the crisis, it is doubtful whether it is the whole story, since even before the crisis, market participants knew about the moral hazard problems in these countries. Thailand is a interesting case to examine because before the crisis Thailand has been both bank based and stock market based as equally important as noted by Hoontrakul [1996].

Recently, several researchers have constructed models of financial crisis that emphasize how a shock, real or nominal, can be amplified by the so-called "financial accelerator" mechanism (Bernanke, Gertler, and Gilchrist, 1999). The basic story in these models is that the initial currency depreciation, and drop in aggregate demand, if it affects the credit access of some subset of firms, can ultimately lead to a massive depreciation, and an economic depression. Later Chaipravat and Hoontrakul [2000] assert how Thai credit market in the 1997 crisis aftermath has collapsed. Firm sizes are highly correlated with the availability of information and credit access. The high or low monitoring industry type has also different access to funding. Hence, each firm is impacted from the crisis differently from microeconomics of information point of view.

Chang and Velasco (1999), Krugman (1999), and Aghion, Bacchetta, and Banerjee (2000) all develop models in which credit access of a particular firm depends on the firm's "internal wealth." In fact, the 'self-financing' or 'internal wealth' is predominance in most of the firms in every part of the world as claimed by Allen and Gale [2000]. "Internal wealth" is defined as wealth not subject to borrowing constraints, and typically includes the cash-flow and liquid assets of the firm. Internal

wealth rises with increased cash-flow and liquid assets. In addition, in these models, "internal wealth" declines with rising debt-equity ratios. This is because credit constraints may tighten when the firms' debt-equity ratios rise. Banks may become more cautious in lending to firms with high debt-equity ratios, since the bankruptcy probabilities of these firms are higher.

With binding credit constraints, a slight currency depreciation or drop in aggregate demand, if they result in a decline in the internal wealth of firms, can lead to a sharp curtailment of bank credit. This curtailment in bank credit can cause firm earnings to decline sharply. Firm may then cut back employment and investment, leading to a further decline in output. The curtailment in bank credit and fall in output will result in an increase in default probabilities, an outflow of capital, and a possible collapse of the currency. It would be even more interesting to examine a extreme currency depreciation in Thailand during 1997 to 2000.

Although many analytical models of the East Asian crisis have been developed, empirical work testing the implications of the various models has lagged behind. This paper helps to fill the void in the literature. Specifically, we will test if the models that emphasize the importance of "internal wealth" and credit constraints are useful in explaining the East Asia crisis.

In carrying out our investigation, we will use rare, firm-level data for Thailand. If credit constraints are important, then the earnings of Thai firms with certain characteristics should decline by more during the crisis. For example, during the crisis, Thai firms with high debt-equity ratios should have experienced a sharper fall in earnings than firms with low debt-equity ratios. Of course, many other factors affect earnings during crisis times. Although a depreciation of the currency may raise debt-equity ratios (in baht terms), a currency depreciation is certainly beneficial for exporting firms. This *product market channel* may help increase firm earnings. In our empirical work, we control for industry and other characteristics, to try to isolate the impact of the crisis on firm's earnings, through the *credit channel*.

Our results indicate that firms with the highest debt-equity ratios suffered the steepest declines in earnings per share during the crisis. We take this as strong evidence for *the credit channel*.

This paper is organized as follows. In the next Section, we describe the impact of the crisis on Thai firms. In Section 3, we describe the data. In Section 4, we develop a simplified model of the Thai firm during the crisis. In Section 5, we present the estimation equation. In Section 6, we present the results. Section 7 concludes.

2. Impacts on Thai Firm after 1997 :

When Thai baht was floated on July 2, 1997, all private firms were desperately vulnerable to the extreme macroeconomic shocks. The baht slid from 25.7 baht/US\$ prior the float to peak around 56.9 baht/US\$ in January 1998. To stabilize its currency, high interest rate [e.g. above 20%] was maintained for almost a year afterward and further damaging firms' balance sheet. During 1999 to 2000, baht was traded around 37.0 to 43.0 baht/US\$. The financial sector began to shrink rapidly and aggregated demand dropped significantly. GNP growth rate in 1998 plunged to over -10% and bounced back around 5.0% in 1999-2000. The core inflation surged initially to 7.8% in 1998 as the direct result of devaluation. But the inflation remained subdued around 1 to 2% in the following two years due to excess in capacity and depletion in inventory. The export growth in 1998 was initially decline to -6.8% and grew back 7.4% and 16.9 in 1999-2000. The current project for export growth in 2001 is widely expected to be negative. Many attributed this phenomenon to capital structure readjustment, while other claimed as the wealth effect from USA. Note that the relative price effect was ruled out due to competitive devaluation in the region. The import growth was -33.8%, +16.9 and 31.3% during 1998-2000. Manufacturing bottomed in the third quarter of 1998.

One of major problems in Asian crisis of 1997 was the massive buildup of foreign debt by private corporation to finance ambitious investment. Large firms and financial institutions were able to directly raise fund from abroad, while Security Exchange of Thailand [SET] enjoyed unprecedented boom in mid 1990's. Small and medium enterprise [SME] also enjoyed positive *externality* from lending boom from domestic banks' excess liquidity and corporates' ambitious

investment. After the full fledged financial economic crisis, private firms were struggling to survive. Debt deflation began; the liquidity trap straddled.

Capital market dried up on-shore as well as off-shore. Total market capitalization of SET has fallen by 70% from 5,000 billion bahts in 1997 to 1,500 billion bahts from the end of 2000. SET index hit lowest point (207) on the last day of August 1998 against the heyday SET index of 1700 in mid 1990's. The total foreign debt was steadily reduced by at least 30% from over 110 billion US\$ to 78 billion US\$ in 4 years after the debacle. Most of the repayment came from large corporations and FDI. After decade of consecutive budget surplus and no debt, Thai public sectors began to accumulate in foreign debt was increasing fast partly from 17 billion dollars bail-out IMF package loans. Almost half of FDIs were in the automobile sector, with others spread across chemicals, electronics and light industry as per Phongpaichit and Banker [2000] analysis. Little FDI was found for SME sector due to the lack of economy of scale and information availability.

On the other hand, all financial intermediary institutions were seriously damaged. The 56 out of 92 finance firms were closed in December 1997. The 6 out of 11 private banks were nationalized and four banks were later acquired by foreigners. Total non-performance loans (NPLs) for banking system had peaked at 50% level in mid of 2000. About three quarter of SMEs' loan were NPLs and mostly unrestricturable, while more than half of large firms were worked out as asserted by Chaipravat and Hoontrakul. Note that retail loans were insignificant with little loan work out problem. Liquidity traps were straddled from mid of 1999 onward. Interest rate remained low to keep dysfunctional banks afloat; private investment was slumped. Very large corporate took further advantages by refinancing their foreign debt with domestic debt. Overall, credit market fails, especially in SME market. Net credit extension remains negative from 1997 to 2000. Most use its 'internal wealth' according to Jantaraprapavech [2001]. Running down their capital, streamlining their business process, selling off their non-core asset are among the alternative internal sources of funding.

3. The Data.

The firm level panel data are extracted from the CD-ROM obtained from the Thai Stock Exchange. The CD-ROM contains balance sheet and income statement information between 1996 and 1999 for over 400 firms listed on the Exchange. Of the 412 firms listed on the Exchange in 1996, 46 were banks and finance companies. Of the 377 non-financial firms listed in 1996, 46 became non-listed by 1999, because of bankruptcies and workouts. In addition, we dropped 81 firms, because of missing observations. Thus, our final working sample is a four year (1996-1999) panel of 296 non-financial firms.¹

We are aware of at least one other panel data set of Thai firms. The World Bank randomly sampled 652 Thai firms in 1998, with retrospective questions for 1997 and 1996. The data set is described in Hallward-Driemeir (2000). The World Bank sample includes both listed and the smaller, unlisted firms, and contains balance sheet and income statement information. Hallward-Driemeir (2000) mentions some caveats in using the World Bank data. First, response rates were quite low. Second, the unit of observation is the plant or the enterprise, and not the firm. It is unclear how informative balance sheets and income statements are at the enterprise or plant level. The record keeping at the firm level is probably much better, since it is the firm that pays taxes, not the enterprise or plant. Finally, the data are not in accord with any standard accounting rule; each survey respondent answered each question subjectively. The accounting statements of our firms were audited by internationally accredited accountants.

¹ There may be survivorship bias in our working sample. The firms that survived the Thai crisis were probably less financially constrained than firms that failed during the crisis. However, our main conclusion that the earnings of financially constrained firms suffered more during the crisis should be robust to this survivorship bias. For example, suppose that during the crisis, firms with highest debt equity ratios suffered the largest declines in earnings per share. This finding would be strengthened should somehow failed firms were to be included in the working sample. Since failed firms on average would have higher average debt-equity ratios and more negative earnings than surviving firms, including the failed firms will result in a larger impact of the debt-equity ratio on earnings per share.

4. The Model of the Thai Firm During the Crisis.

In our empirical work, we relate changes in earnings per share during the crisis to industry characteristics, firm size, and firm indebtedness. The crisis affects the earnings per share of firms through both the product and credit market channels.

The Product Market Channel.

We assume that the representative Thai firm either exports its output, or sells its output domestically. Also, we assume that inputs to production are imported (raw materials, machinery) or produced domestically (labor, office rents). Thus, we can express the earnings per share of the Thai firm in industry i as:

$$\left(\frac{E}{S}\right)^P = \frac{e * P^E * Q_i^E}{S} + \frac{P^D * Q_i^D}{S} - \frac{(c_i + c_i^F * e) * (Q_i^E + Q_i^D)}{S}, \quad (1)$$

where e is the exchange rate (in Thai baht per dollar), P^E is the export price (in dollars), P^D is the price of domestic sales (in baht), Q^E, Q^D are export and domestic sales, and c, c^F are the costs of domestically produced (in baht), and imported inputs (in dollars) necessary to produce a unit of output. Equation (1) says that earnings is equal to export sales revenues *plus* domestic sales revenues *minus* total costs (all per share).

Totally differentiating equation (1),

$$d(E/S) = \frac{P^E * Q_i^E * de}{S} + \frac{P^D * dQ_i^D}{S} - \frac{c_i^F * (Q_i^E + Q_i^D) * de}{S} - \frac{(ec_i^F + e) * dQ_i^D}{S}, \quad (2).$$

where we have assumed for simplicity that $dP^E = dP^D = dQ^E = 0$. That is, export and domestic prices and export sales remain constant. Of course, during the crisis, export prices, domestic prices, and export sales all changed. However, changes in these variables were certainly much smaller than the massive depreciation of the Thai exchange rate ($de > 0$), and the collapse in domestic sales ($dQ^D < 0$). Thus, to focus on the variables most relevant in impacting the earnings of Thai corporations during the crisis, we neglect changes in export prices, domestic prices, and in export sales. Moreover, we assume during the crisis, domestic sales was entirely demand determined. That is, the firm's optimal output level (supply at given prices) was higher than the demand for its products; the firm had excess capacity.

From equation (2), we can see how firms with different characteristics can differ in their susceptibility to the crisis. **First, the earnings of export-oriented firms should decline by less than the earnings of domestic-oriented, importing firms.** Export revenues are boosted due to the depreciated exchange rate, while domestic-oriented firms suffer from declining domestic sales. **Second, the earnings of firms with a high proportion of imported machinery, raw materials, and other intermediate products should suffer more than the earnings of firms with mostly domestic-produced inputs.** The depreciation of the baht will sharply raise the costs of firms importing a high proportion of intermediate products.

The Credit Market Channel.

So far, we have focussed on how changes in the exchange rate and in domestic demand influence earnings through the product market channel. However, during the crisis, an important determinant of firm earnings was the availability of credit from banks. Because of weaknesses in their balance sheets and in the balance sheets of banks, some firms faced difficulty in borrowing. This difficulty in borrowing may manifest itself in two ways. First, firms may have to pay a higher interest rate on borrowing. Second, the firm may simply not be able to borrow from banks; banks may ration credit. To raise funds, the firm may have to borrow from the black market with very high interest rates, or sell its assets. We summarize this extra cost of bank credit, as a fraction of total shares outstanding, as:

$$\left(\frac{B}{S}\right) = \frac{k_i * (D_i + e * D_i^F)^B * (Q_i^E + Q_i^D)}{S} \quad (3)$$

where k captures the credit stance of banks; D is the domestic debt-equity ratio and D^F is the foreign debt (in dollars)-equity ratio of the firm in industry i . B is a parameter less than one. Equation (3) says that as the debt-equity ratio of the firm rises, the risk of bankruptcy of the firm increases, leading to a cutback in bank credit, such as a rise in the cost of external financing.

Totally differentiating (3), $d\left(\frac{B}{S}\right)$ equals,

$$\frac{(D_i + e * D_i^F)^B * Q_i * dk}{S} + \frac{B * k * (D_i + e * D_i^F)^{B-1} * Q_i * de}{S} + \frac{k * (D_i + e * D_i^F) dQ_i}{S}$$

(4)

where we have substituted $Q_i = (Q_i^F + Q_i^D)$. The first term says that during the crisis, as banks tightened credit ($dk_i > 0$), the cost of borrowing rose. This tightening of credit may have differed by industry and may have been more severe for small firms, and less severe for firms with revenues that increased during the crisis, such as exporting firms. For the same tightening of credit, firms with higher domestic and foreign debt-equity ratios had higher borrowing costs. The second term says that as the exchange rate depreciated ($de > 0$), foreign debt in baht increased, leading to higher borrowing costs. Finally, there is an offsetting third term; as demand for the firm's output fell during the crisis, the firm had less need to borrow, lowering the cost of borrowing.

From equation (4), we can see how firms differed in their susceptibility to a crisis-induced credit tightening by banks. **First, certain firm characteristics may affect how much banks tighten their credit (dk_i). Export oriented firms, who have higher cash flows during the crisis, may suffer less from credit tightening.** Banks, observing these cash flows, are more likely to lend to these firms. **Large firms or firms with high market capitalizations may suffer less than smaller firms.** Banks have more information about large firms. Small firms are more likely to fail during crisis, making banks more cautious. **Second, firms with high debt-equity ratios may suffer more from a given cut in bank credit than firms with low debt-equity ratios.** **Third, firms with a high proportion of foreign currency debt will suffer more than firms with mostly domestic debt.** As the exchange rate depreciates, total debt in baht terms increase.

The total impact of the crisis on firm earnings from the product and credit markets, $d(\frac{E}{S})^T$, is thus the sum of equation (2) and (4):

$$d(\frac{E}{S})^T = d(\frac{E}{S})^P + d(\frac{B}{S}).$$

5. The Estimation Equation.

In our empirical work, we relate changes in earnings per share during the crisis to firm and industry characteristics. Our estimating equation is:

$$\left(\frac{E}{P}\right)^T = \alpha + \gamma_t + \beta * (X_i * \gamma_t) + \varepsilon_{it}, \quad (5)$$

where α is a constant, γ_t are yearly-dummy variables (three, for the years 1997, 1998, and 1999, where 1996 is the initial year); X_i is the set of characteristic of the industry or the firm in 1996, the initial year; and β identifies how industry- and firm-specific differences affect the earnings of a firm during crisis.

We take 1996, the year before the crisis as the initial year, when firms were operating in a normal environment; 1997 and 1998 were the crisis years; 1999 was the recovery year. To take an example, suppose X_i is the firm's debt-equity ratio in 1996. β_{1997} and β_{1998} capture the effect of an increase in initial corporate indebtedness the crisis on earnings,. In this example, $\beta_{1997} > 0$ and $\beta_{1998} > 0$ are evidence of the "credit-channel;" at a time of crisis, firms with higher initial indebtedness had greater difficulty borrowing from banks.

We include the following three variables in X_i : a dummy variable indicating whether the firm is in an industry that is exporting (EXP), or importing (IMP, importing intermediate products), or producing non-tradeables; the market value of the firm in 1996 (MKTV96, a measure of firm size); and the debt-equity ratio of the firm in 1996 (DEBT96/EQUITY96). In addition, we include as a

control variable (without interaction with the time dummies), a dummy variable indicating whether the firm is in an industry borrowing mainly from domestic private banks, or from foreign and government banks.

As mentioned, the EXP and IMP dummies capture mainly the product market channel, but may also capture the credit market channel. During the crisis, the revenues of export-oriented firms increased, but those of domestic-oriented, importing firms fell. In fact, since the costs of imported inputs rose, the earnings of importing firms should have fallen by more than the earnings of firms producing non-tradables, who suffered only from a decline in domestic demand. With regard to the credit market channel, banks were more likely to have kept on extending credit to exporters, with healthier cash-flows, than to importing firms. Table A1 categorizes the Thai industries in our working sample by trading status.

The size and debt-equity ratios capture mainly the credit market channel. The earnings of large firms (firms with large market capitalizations) are expected to withstand the crisis better than the earnings of small firms. Banks have more information about large firms; the probability of bankruptcy of small firms is also higher. Firms with higher debt-equity ratios are more likely to fail during crisis.

Finally, the type of bank a firm borrows from affects earnings through the credit market channel. The sign of the effect, however, is ambiguous. On the one hand, the damage to earnings per should be more severe for firms in industries borrowing mainly from domestic private banks. The crisis should damage the balance sheets of domestic private banks more than the balance sheets of government-owned and foreign banks. On the other hand, firms borrowing from foreign banks borrow mainly in foreign currency. As mentioned, the credit constraint becomes more severe during a crisis for firms with high foreign debt. Table A2 categorizes Thai industries in our working sample by type of borrowing bank.

6. The Results.

The results from estimating equation (5) are depicted in Tables 1 and 2.² In Table 1, column 1, only the year dummy variables are included in the regression (1996 is the baseline). Earnings per share in 1997-99 was much lower than in 1996, owing to the crisis. The 1997 dummy is highly negative and significant, showing the severe negative impact of the crisis on earnings per share. The 1998 dummy is insignificant, suggesting a leveling-off of crisis effects. The 1999 dummy is again highly negative, suggesting that the 1998 leveling-off was only tentative and possible slowdown to the uncertainty in general election. Nevertheless, what interesting on Table 2 (row YEAR98, 99) is the insignificance of dummy variables in all cases for both years - 1998 and 1999 when we include the credit market variable – debt to equity ratios. This suggests that the financial economic crisis on July 2, 1997 is one time event with long lasting impact on firm's balance sheet.

The earnings per share of the largest firms fell the most during the crisis. In Table 1, column (2), we include year-dummies, interacted with firm-size (market capitalization in 1996). Taken together, the coefficients for 1997 and 1998 imply that a 100 baht increase in 1996 market capitalization would have lowered earnings per share by about 35 baht during the crisis. To see this, from the third column of Table 1, we can see that the sum of coefficients on YEAR97*MKTV96 and YEAR98*MKTV96 is 0.38 or about 0.35. Thus, a 100 baht change in MKTV96 will over two years (1997-98) change the earnings per share by 35 baht ($=100*0.35$). Possibly, most of the 'financial wealth creation' in 1996 was due mainly to higher 'financial' leverage effect as per the path-breaking Modigliani-Miller [1958] proposition I. In addition, the larger the firm the more opportunity is to borrow externally because of more public information readily available. Note that in comparison to 1996, the interest rate in 1997 to 1998 was relatively very high to defend its currency

depreciation. Firms which borrowed more externally in 1996 than those resort from their internal sources had faced high financial distressed costs [e.g. cost of capital, bankruptcy cost, etc.] from high interest rate and credit crunch. In other words, apart from the currency depreciation loss, firms suffer severely from adverse effects on their capital structure via credit channel consistent with Hallward-Driemeir [2000, pp. 13-14] findings. These result are robust to controlling for the firm's initial debt-equity ratio and industry (Table 2; column 4). Another intriguing is the insignificance of the firm size consideration in 1999 (Table 1 and 2; row Year99*MKTV96). Perhaps, after the initial shock in de facto baht devaluation, it took the firms about 2.5 years to adjust well in both their product and credit channels. In few words, the financial crisis is *an event* but the restructuring both channels are a multiple years *process* afterward. It remains to be seen what would really happen after the first initial adjustment for the first initial shock given the weakening domestic and overseas demand in 2001.

Alternatively, scale-effects in costs may further help explain why the earnings per share of the largest firms suffered the most during the crisis. In equation (1), we assumed constant unit costs; unit costs do not depend how much the firm is producing (c_i and c_i^F do not depend on the scale of output). However, suppose--as it seems likely--that unit costs decline with production. Large Thai firms will then have lower unit costs than small firms. Given scale effects, as production declines with the crisis, unit costs will increase. In fact, since the largest firms will bear the brunt of the decline in demand, the unit costs of the largest firms will increase faster than the unit costs of the smaller firms. Thus, during a crisis, the earnings per share of the largest firms may fall faster than the earnings per share of the smaller firms. From Table 1 and 2, column 4, if the scale effect is the case, then the effect would be *asymmetric* impact. It damaged more to import related industry than in export related industry during the adjustment period in 1998 and 1999 as evidence from insignificance of YEAR98 and 99*IMP from both Tables. Exporter may operate at their full capacity, while importer

²The low R-squares are typical of cross-section work in corporate finance.

may face a supply discontinuity or capacity underutilization.

Earnings per share was not affected by whether a firm belongs to an industry borrowing from a domestic bank, or from a government/foreign bank (column 3), confirming the theoretical ambiguity. As expected, the crisis affected the earnings per share of importing firms by more than those of exporting firms (column 4). Since the baht flotation was done in the mid of 1997, the lagging effect in 1997 was not clear evidence in both export and import until the subsequent year. Essentially, the import had collapsed in the 1998 and 1999, while the export had surged. It is worth noted that Thailand have had a trade surplus, on average, more than one billion US\$ per month during this period by using up all idle capacity. But this trade surplus should not expected to continue or to be sustainable in 2001 since Thai export industries have a very high import content or mostly reprocessing type rather than high valued added industries and services.

As per earlier discussion, firms with high initial (1996) debt-equity ratios experienced sharper declines in earnings per share during the crisis owing to their capital structure. In Table 2, we include year dummies, interacted with the firm's initial (1996) debt-equity ratio. Given our estimates, a rise in the initial debt-equity ratio by 10 percentage points (say, from 300 percent to 310 percent) would lower earnings per share during the crisis (1997-99) by about 130 baht. That firms with the highest debt-equity ratios suffered the most from the crisis is strong evidence for the *credit market channel*. This result is robust to the inclusion of various controls, including firm size, trading status, and type of borrowing bank.

7. Conclusions.

In this paper, we developed and estimated a model of the Thai firm during the crisis. Our results indicate that firms with the highest debt-equity ratios suffered the steepest declines in earnings per share during the crisis from the financial distressed costs. We take this result as strong evidence for the credit channel. Surprisingly, firms with the largest market capitalizations suffered more than

the smaller firms owing to their capital structure and financial leverage effect. The firm size is moreover noted to be positively correlated with leverage owing to readily available public information to fund providers.

We also witness *asymmetric impact* between the industries – exporters, importers and intermediate. We take this as evidence of different scale-effects on different industries, a feature that we do not explicitly model. In other words, the production effect is more pronouncing in import related industries than the export oriented one. Note that firms that import intermediate goods suffered greatly from the crisis from both credit and production channels. Taken together, our overall results indicate that the crisis damaged the earnings per share of firms more on credit channels than the production channels.

Our results have important policy implications. First, regulatory authorities in emerging markets should be aware of the risks posed by high debt equity ratios. Firms with high-debt equity ratios are especially vulnerable during crisis. Second, regulatory authorities in emerging markets should be aware on asymmetric impact in production channel on different industries. When the exchange rates depreciates during crisis, firms importing goods are especially vulnerable. As a reprocessing industrial based, Thailand has many manufacturing firms importing machinery and parts. There exists a tradeoff between the benefits from currency devaluation from exports, and the severe adverse impact through the credit channel.

Reference :

Aghion, P., and Bacchetta, P., and Banerjee, A. [2000]. "Currency Crises and Monetary Policy in an Economy with Credit Constraints," mimeographed, MIT.

Allen, F. and D. Gale [2000] 'Comparing Financial System', MIT Press.

Bernanke, B., M. Gertler, and S. Gilchrist. [1999]. "The Financial Accelerator in a Quantitative Business Cycle Framework," in J. Taylor and M. Woodford (eds.), Handbook of Macroeconomics, Vol. 1C, 1341-1391.

Chaipravat, Olarn and Pongsak Hoontrakul [2000] 'Thai Credit Market Failures : the 1997 Aftermath', TDRI Quarterly Journal, Vol. 15, No. 4.

Phongpaichit, P. and Chris B. [2000] 'Thailand's Crisis', Thailand:Silkworm Books.

Hallward-Driemeier, M. [2000]. "Firm-Level Survey Provides Data on Asia's Corporate Crisis and Recovery,' mimeographed, World Bank.

Hoontrakul, Pongsak [1996] 'Should Thailand have a bank-based or stock market based financial System,' Journal of Business Administration, 19, no. 70

Jantaranprapavech, Sureporn [2001] 'The Bond Market in Thailand', paper presented at the second Brainstroming Workshop on Developing Corporate Bond Market, ADB Institute.

Modigliani, F. and M. H. Miller [1958] 'The cost of capital, corporation finance and the theory of investment', American Economic Review, June 1958, 261-297.

Table A1

International Trading Status by Thai IndustryExporting

Agriculture
Electronic Products
Electronic Components
Jewelry and Ornaments
Textiles

Importing Intermediate
Products

Building and Furnishing
Chemical and Plastic
Communication
Energy
Household Goods
Packaging
Pharmaceuticals
Printing
Pulp and Paper
Transportation
Vehicles

Non-Tradeables

Comm.
Entertainment
Food and Beverage
Health.
Hotels
Insurance
Professional Service
Property Development
Warehousing

Table A2

Thai Bank Borrowing by IndustryDomestic Private Banks

Agriculture
 Comm.
 Entertainment
 Food and Beverage
 Health.
 Hotel
 Household Goods
 Insurance

Foreign and Government Banks

Building and Furnishing
 Chemical and Plastic
 Communication
 Electronic and Computer Products
 Electronic Components
 Energy
 Transportation
 Vehicles and Parts

Jewelry and Ornaments
 Machinery and Equipment
 Mining
 Packaging
 Pharmaceuticals
 Printing
 Professional Service
 Property
 Pulp and Paper
 Textiles
 Warehousing

Table 1

Impact of Crisis on Firm Earnings
(Dependent Variable: Earnings per Share)

	(1)	(2)	(3)	(4)
CONSTANT	4.88 (4.25)	4.88 (4.39)	5.45 (4.64)	4.88 (4.43)
YEAR97	-16.34 (-10.07)	-13.86 (-8.65)	-13.91 (-8.68)	-10.13 (-5.04)
YEAR98	-0.25 (-0.15)	-1.55 (-0.97)	-1.61 (-1.01)	-3.18 (-1.58)
YEAR99	-4.61 (-2.84)	-4.67 (-2.91)	-4.72 (-2.95)	-5.46 (-2.71)
Foreign and Gov. Bank Borrowing			-1.82 (-1.51)	-0.43 (-0.31)
YEAR97*MKTV96 (coeff. *100)		-0.89 (-7.94)	-0.87 (-7.73)	-0.81 (-7.08)
YEAR98*MKTV96 (coeff. *100)		0.47 (4.19)	0.49 (4.33)	0.47 (4.15)
YEAR99*MKTV96 (coeff. *100)		0.21 (0.18)	0.39 (0.35)	0.44 (0.39)
YEAR97*EXP				-0.71 (-0.25)
YEAR98*EXP				4.27 (1.48)
YEAR99*EXP				4.42 (1.52)
YEAR97*IMP				-11.01 (-4.34)
YEAR98*IMP				2.01 (0.79)
YEAR99*IMP				-0.66 (-0.26)
R-squared	0.11	0.16	0.16	0.18

Note: T-statistics in parentheses; 1184 Observations (296*4 years).

Table 2

Impact of Crisis on Firm Earnings
(Dependent Variable: Earnings per Share)

	(1)	(2)	(3)	(4)
CONSTANT	2.48 (3.88)	4.88 (4.41)	4.88 (4.59)	4.95 (4.33)
[DEBT96/EQUITY96]*YEA R97	-938.69 (-12.42)	-647.11 (-7.72)	-745.61 (-9.21)	-710.61 (-8.67)
[DEBT96/EQUITY96]*YEA R98	-89.16 (-1.18)	-228.26 (-2.72)	-185.94 (-2.29)	-184.01 (-2.24)
[DEBT96/EQUITY96]*YEA R99	-356.86 (-4.72)	-394.22 (-4.71)	-398.87 (-4.92)	-388.04 (-4.74)
YEAR97		-10.91 (-6.35)	-7.24 (-4.28)	-4.15 (-1.98)
YEAR98		1.66 (0.97)	-0.92 (-0.05)	-1.68 (-0.81)
YEAR99		-1.31 (-0.76)	-1.13 (-0.67)	-2.22 (-1.06)
Foreign and Gov. Bank Borrowing				-0.22 (-0.16)
YEAR97*MKTV96 (coeff. *100)			-1.11 (-9.43)	-0.95 (-8.61)
YEAR98*MKTV96 (coeff. *100)			0.44 (4.05)	0.43 (3.92)
YEAR99*MKTV96 (coeff. *100)			-0.48 (-0.44)	-0.37 (-0.33)
YEAR97*EXP				-2.77 (-0.98)
YEAR98*EXP				3.78 (1.34)
YEAR99*EXP				3.32 (1.18)
YEAR97*IMP				-8.57 (-3.29)
YEAR98*IMP				2.79 (1.06)

YEAR99*IMP				0.74 (0.28)
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R-squared	0.12	0.17	0.23	0.24
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Note: T-statistics in parentheses; 1184 Observations (296*4 years).