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Capital Structure and Financial Risk: Evidence from Foreign Debt Use in East Asia

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ABSTRACT

Using a data set of East Asian nonfinancial companies, we examine a firm's choice between local, foreign, and synthetic local currency (hedged foreign currency) debt. We find evidence of unique as well as common factors that determine each debt type's use, indicating the importance of examining debt at a disaggregated level. We exploit the Asian financial crisis as a natural experiment to investigate the role of debt type in firm performance. Surprisingly, we find that the use of synthetic local currency debt is associated with the biggest drop in market value, possibly due to currency derivative market illiquidity during the crisis.

CAPITAL MARKETS, BOTH DEBT AND EQUITY, are becoming more global. For example, in 2000, 434 foreign companies from 51 different countries had listed shares on the New York Stock Exchange. This compares to only 60 foreign listings from a dozen countries in 1990. Recent research has examined the issuance of foreign equity and cross-listing by non-U.S. corporations (see Foerster and Karolyi (1999), Miller (1999), and Chaplinsky and Ramchand (2000)). Other related research has investigated the capital structure choice of various samples of non-U.S. firms (see Booth et al. (2001) and Rajan and Zingales (1995), among others) using aggregate debt-to-value ratios. While this prior work enhances our understanding of aggregate capital structure choices, very little is known about the way firms make

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capital structure decisions in regards to the currency denomination of debt.[1] This is important, especially for non-U.S. firms, which raise a large proportion of their debt in foreign currency and which frequently use more foreign debt than foreign equity.[2] In addition, the choice of currency is complicated by the ability of firms to effectively convert foreign currency denominated debt into "synthetic" local currency debt by using foreign exchange derivative contracts.

Our analysis employs a unique database put forth by SBC Warburg Dillon Read (SBC-WDR) describing both "natural" (NLC) and "synthetic" (SLC) local currency debt as well as foreign (FC) currency debt used by 327 of the largest East Asian (EA) corporations from 1996 to 1998. Using this database, we examine the determinants of, and the interlinkages between, these three types of debt. In other words, we examine whether it is sufficient to study capital-raising decisions at an aggregate level or if analyzing the components of debt capital by currency denomination yields additional insights. We argue, and find confirming empirical evidence, that there are unique motivations that determine the use of each debt type. Thus, examining aggregate capital structure might mask factors that affect only the mix of debt types. Similarly, factors that affect the aggregate capital structure choice may be the result of separate decisions concerning the choice and mix of debt types, not necessarily the result of a single decision regarding aggregate debt.

Another interesting aspect of our sample is that it spans the 1997 Asian financial crisis, providing a unique natural experiment. The extreme depreciation of many regional currencies and the ensuing economic fallout is an example of an event that should reveal the risks associated with the use of alternative types of debt and, in particular, FC debt. Thus, the crisis allows us to measure directly changes in financial and operating performance associated with an exchange rate shock and relate these to the use of FC debt. Previous research has suggested that large amounts of FC debt contributed to the poor performance of EA firms and that foreign debt may be in part responsible for the Asian crisis (see Krugman (1999) and Chang and Velasco (1999), among others, for theoretical arguments; see Harvey and Roper (1999) for empirical evidence).[3] Our data allow for direct tests of this hypothesis.

[1] Prior studies have been limited to examining certain types of foreign debt. For example, Miller and Puthenpurackal (2000) examine Yankee Bond issuance, Chaplinsky and Ramchand (2001) investigate SEC Rule 144A debt, and Kim and Stulz (1988) and Kedia and Mozumdar (2001) examine foreign public debt issuance by U.S. corporations. Harvey, Lins, and Roper (2001) examine valuation effects for emerging market companies of internationally syndicated term loans as well as new issues in the Eurobond and Yankee bond markets. Studies primarily in the accounting and taxation literatures (e.g., Froot and Hines (1995), Newberry (1998), and Newberry and Dhaliwal (2001)) have examined the relation between debt use by U.S. multinational corporations and corporate taxes.

[2] For example, in the sample of firms examined in this study, only 35.8% have equity listings outside their home country, whereas 61.7% have foreign currency (FC) denominated debt. Foreign debt constitutes 41.8% of total debt for the firms in our sample with FC debt.

[3] Harvey and Roper (1999, pp. 63–64) suggest that "corporate managers levered up their investment in a period of declining performance in an attempt to 'bet' on the long-run performance of their firms . . . [and] increased the stake by using foreign currency denominated debt."

While not often addressing the choice of local versus foreign debt directly, financial theory does provide guidance on the choice of debt type. Since local and foreign debt are types of debt, theories of optimal capital structure (e.g., static trade-off, pecking order, and agency cost) should also be applicable in explaining the decision to use foreign and local debt.[4] However, the theories need to be expanded to include factors specifically related to debt type. For instance, if there exist differences in interest rates across countries, this should figure into the trade-off between local versus foreign borrowing. Specifically, firms are likely to make a trade-off between the benefits of lower foreign borrowing costs and a probable increase in financial risk due to exchange rate uncertainty.

The choice between natural and synthetic local currency debt has not been previously examined. Since NLC and SLC debt are in many ways both local currency debt, one may hypothesize that their use is similarly determined. Still, the mix between synthetic and natural local currency debt is likely related to factors characterizing the relative costs between the two, such as the sizes of local and foreign debt markets, differences in effective interest rates between the two markets, and the costs of foreign currency risk management. For example, if the costs of foreign currency derivatives are high, then firms should use less synthetic versus natural local debt, all else being equal.

We start by examining aggregate capital structure in a manner similar to Rajan and Zingales (1995) and Booth et al. (2001). We find results consistent with prior findings, and use these as a benchmark for our examination of debt type. In our disaggregated analysis, we identify which factors are important for each type of debt. Some factors are related to only one type of debt, others to multiple types. For example, variables related to risk management (foreign EBIT and cash holdings), agency costs (asset tangibility), large external capital needs (capital expenditures), and to the pecking order theory (foreign equity listing) are important in explaining levels of foreign currency, but not natural local currency debt. On the other hand, size and market-to-book are related to levels of both foreign and natural local currency debt. Consistent with implications of the static trade-off theory, the direct costs of debt (as measured by the difference between local interest rates and LIBOR) are important determinants for both local and foreign debt use. We find that the higher the difference in interest rates, the higher (lower) the level of foreign (local) currency debt. These results are consistent with evidence that EA firms are likely to borrow in foreign currency in an attempt to exploit lower interest rates (see also Kim and Stulz (1988)). Some factors are found to influence only local currency debt levels. We find a strong negative relation between operating margins and NLC debt levels, which is consistent with a pecking order theory of capital structure. Finally, the decision to use synthetic local debt seems to be primarily motivated by risk management concerns. We find a negative relation between both foreign EBIT and the interest rate differential and the level of SLC debt. This suggests that managers trade off the benefit of

[4] See Harris and Raviv (1991), Titman and Wessels (1988), and Booth et al. (2001), among others, for detailed discussions on testing alternative capital structure theories.

lower interest expense with foreign exchange risk that cannot be covered with other risk management tools, such as foreign currency cash flows.

Our data also allow us to examine interlinkages between the three types of debt. There exists a negative relation between SLC debt and NLC debt, suggesting that these are used as substitutes. We also find a significant positive relation between both types of local debt and FC debt, implying that local and FC debt are used as complements. To the extent possible, we also control in our multivariate tests for differences between features of local and foreign currency debt, such as differences in maturity structure. While we find that maturity structure is important in the FC debt choice, our results remain robust to this control, suggesting that FC debt is not used just to access long-term debt.

We next examine how alternative types of debt relate to firm performance during the Asian crisis. We investigate both financial and operating performance using a variety of alternative performance measures. As expected, our findings suggest that leverage, *regardless of type*, negatively affected the financial performance of EA firms during the crisis (as measured by equity returns, interest coverage ratios, and modified *Z*-scores). In contrast with prior findings, foreign currency debt did *not* have a significantly larger impact on financial performance than local currency debt. This suggests that the firms in our sample did not use FC debt in a less prudent manner than NLC debt. Most surprisingly, SLC debt (i.e., *hedged* FC debt) is associated with significantly *worse* performance. We provide evidence that this result is due to foreign exchange derivative market illiquidity during the crisis, which kept firms from being able to "roll over" short-term hedging strategies associated with SLC debt. Results using measures of operating performance show a similarly negative (but weak) effect of SLC debt on sales and operating margins.

Finally, we quantify the direct impact of exchange rate depreciations on EA firm value. Overall, the increase in foreign debt liabilities net of hedging and foreign cash reserves (measured in local currency terms) accounts on average for only 37% of the decline in firms' market values (although there exists substantial variation across both countries and industries). This can be interpreted either as (1) stock market overreaction or as (2) economic aspects of the crisis (as opposed to direct financial aspects) causing the majority of stock markets' declines. Interestingly, about 7% of EA firms appear to have directly *benefited* from the currency depreciations due to foreign cash reserves in excess of unhedged foreign debt.

The remainder of the paper is organized as follows: Section I describes the data. Section II examines the determinants of total debt and types of debt. Section III tests the relation between type of debt and firm performance. Section IV concludes.

I. Data

During the first half of the 1990s, East Asian firms underwent rapid investment in fixed assets (see Pomerleano (1998)). On average, internally generated funds were not sufficient for financing this expansion, and as a result, most firms depended on external financing. New equity was used less than debt. Consequently,

domestic and foreign borrowing and measures of firms' financial leverage increased significantly in the mid-1990s. For example, prior to the crisis in 1996, the average listed firm in South Korea and Thailand had a debt-to-equity ratio of 3.5 and 2.3, respectively, relative to ratios in the United States and Germany of 1.1 and 1.5, respectively (see Claessens, Djankov, and Ferri (1999)). Much of the debt was denominated in foreign currency. As a result, EA firms were potentially exposed to declines in Asian currencies against the U.S. dollar (USD).

To quantify the use of foreign and local currency debt by EA firms, we rely on a set of SBC-WDR equity reports from 1997 to 1999. These report firms' level, currency (local or foreign) and maturity of debt, the percentage of foreign currency debt that is hedged with foreign exchange derivatives, the level of foreign cash, and the percentage of EBIT earned abroad, among other items, for 1996 to 1998. The firms in the reports are typically about 40 of the largest exchange-listed nonbank firms in each of eight East Asian countries.[5]

Because these data are not from a commercial vendor and were often collected through direct contact with the firms in the sample, we attempted to verify the data's accuracy in two ways. First, we compare the total debt levels reported by WorldScope and by SBC-WDR. These comparisons are reassuring that our data are of good quality. For example, the correlation between the total debt values reported by the two sources in 1996 is 0.92. Second, we verified the quality of the derivative use data by searching through a subset of firms' annual reports. We selected derivative users and nonusers alphabetically from each country so that we would have at least five nonusers and the minimum of all or five users from each country. For the 68 firms searched, there is no reference to hedging debt with derivatives for all but one of the nonuser firms. Furthermore, we find only two firms that use derivatives but do not hedge foreign debt. For example, Singapore's Cycle and Carriage uses forward contracts to manage foreign currency liabilities on imports (according to the 1997 annual report) but apparently not foreign debt exposure. For derivative users, we find specific references to FX derivative use for all but two firms. This cross-checking leads us to conclude that the quality of the SBC-WDR data is very good.

The SBC-WDR data are used to construct three mutually exclusive measures of firm debt: *Natural local currency* (NLC) debt is the total value of debt originally borrowed in local currency; *foreign currency* (FC) debt is the value of foreign currency denominated debt that is left unhedged and therefore exposed to fluctua-

[5] The reports do not coincide exactly with calendar or fiscal years. However, by cross-referencing variables also available in the WorldScope database, it is apparent that the data are most representative of calendar years 1996 to 1998. The exact set of firms surveyed changes slightly from the 1996 to 1997 reports. The project was curtailed in the middle of the data collection stage for 1998 data, so many of the firms have missing observations for this year. We do not have data on the precise currency denomination of debt. However, other evidence suggests that the majority of foreign debt was denominated in U.S. dollars and most of the remaining part in "strong" currencies such as the Japanese yen or the deutschmark (see, e.g., Eichengreen and Hausmann (1999)). It is therefore safe to assume, as we subsequently do, that the vast majority of the foreign debt assumed by EA firms was exposed to currency risk and to a potential depreciation of the local currencies against these currencies.

tions in foreign exchange rates; *synthetic local currency* (SLC) debt is the value of foreign currency denominated debt that the firm has in effect converted into local currency through the use of foreign exchange derivative contracts.[6] These variables are then used to construct debt-to-market-value ratios—the primary variables of interest. Detailed definitions of all variables are provided in Appendix A.

Classifying debt as NLC, FC, or SLC is a necessary simplifying assumption. Other aspects of debt might also be important factors in the subsequent analysis. For example, the physical location of the lender does not always match the currency of the loan—local banks can make loans in foreign currency and vice versa. We make the assumption that original-issue foreign currency debt (FC and SLC debt) is primarily offered by foreign lenders and that original-issue local currency debt (NLC) is primarily offered by local lenders. While this assumption is not necessary for most of the analysis, evidence suggests this is a reasonable, but not perfect, simplification. Obviously firms with public foreign currency debt issues such as Yankee bonds and Eurobonds are borrowing these funds primarily from foreign lenders. However, the distinction between local and foreign lender is not always straightforward. For example, it is unclear whether a local affiliate of a global bank should be considered a local or foreign lender. There may also exist other distinctions between NLC, FC, and SLC debt for which data are unavailable, such as differences in covenants or collateral. Finally, the analysis is also simplified because firms generally appear not to create synthetic foreign currency (SFC) debt. In fact, only one firm in the sample, Tipco Asphalt of Thailand, effectively does this.[7]

We augment the SBC-WDR data set with the WorldScope database, which provides additional balance sheet and income statement data for publicly traded firms. For firms with data not available on WorldScope, we searched Hoover's Online, WorldVest, and company annual reports (in that order) to fill in as many missing data points as possible. Equity returns are obtained from DataStream. For companies not in DataStream, price data are obtained from the listing exchange or company websites when available. Data for some additional variables (e.g., foreign sales, family affiliation, number of shareholders, etc.) are obtained from the Asian Company Handbook and Claessens, Djankov, and Lang (2000). The final data set has complete data for nearly all companies in the 1996 SBC-WDR report. Specifically, at a minimum, there exist basic accounting data and equity return data for 1996 to 1998 for 315 of the 327 firms in the 1996 SBC-WDR report.

Given the widespread financial distress in EA during the sample period, survivorship bias is a potential problem for our performance analysis. Surprisingly,

[6] One drawback to East Asia is the generally less developed foreign currency derivative markets. However, derivatives were readily available to at least the larger EA corporate customers except in South Korea. For more information on EA derivative markets and common hedging strategies, see Reed (1995, p. 4) and Barrett and Foon (1997, p. 28). From discussions with derivative dealers, we learned that most hedging of foreign currency debt with derivatives was with relatively short-term contracts, a result of low liquidity in longer-dated contracts.

[7] We set Tipco's hedge ratio equal to zero, though dropping the company from the sample leaves our results essentially unchanged.

only eight firms exited the sample because of a change in organization from 1996 to 1998. We conjecture that the generally large size of the firms in the SBC-WDR reports results in a lower proportion of the firms in our sample being forced to merge or liquidate (as compared to all publicly traded EA firms). Of the eight firms, four merged with other firms, three went bankrupt, and one was nationalized. Six of the eight firms were foreign debt users and two of the eight firms were hedgers, roughly the same percentage as in the overall sample (61.7% and 21.5%, respectively). Given these facts, we are confident that the performance results are not tainted by a significant survivorship bias.

Panel A of Table I provides sample means and correlations for many of the variables used in the analysis for 1996. To facilitate comparisons, Table I groups countries into high and middle income as defined by the IMF (using relative GDP per capita levels). Overall, the firms in our sample appear somewhat less levered than those in other studies of EA firms. This may be due to the use of market-value ratios in 1996, which was a stock market peak in most of our countries. Firms from middle-income countries use both more FC and total debt than firms from high-income countries (e.g., a total debt-to-value ratio of 0.320 vs. 0.201). Among middle-income countries, firms in Indonesia, Thailand, and South Korea have the highest total and FC debt ratios. South Korean firms are the most levered, with a debt-to-value ratio of 0.677, and also have the highest level of NLC debt. There is substantial variation across EA countries in the use of SLC debt. SLC debt-to-value ratios vary from a high of 0.068 for firms in Indonesia to 0.0 for firms in South Korea (which were prohibited by law from using FX derivatives to hedge FC debt).[8] About 57% of firms' debt is long term (maturity greater than 1 year). This is somewhat higher than values reported by Demirguc-Kunt and Maksimovic (1999) for four of the countries in our sample, but this discrepancy is likely due to differences in average firm size and the sample period. Some interesting relations are also found in the correlation table at the bottom of Panel A. For example, SLC debt is negatively related to NLC debt, thus suggesting that these may be substitutes.

Panel B of Table I reports summary statistics for FC debt users and nonusers by country. Since these univariate statistics only compare FC debt users with nonusers, we discuss them here briefly and defer a detailed discussion to the multivariate analysis. In the entire sample of 327 firms, 202 (61.8%) use foreign debt in 1996. FC debt usage rates vary considerably between countries from a low of 29.3% (12 out of 41) for Malaysian firms to 100% (35 out of 35) for South Korean firms. For FC debt users, there is also variation in the percentage of total debt that is denominated in foreign currency (not tabled); 14.8% of foreign debt users have less than 20% of their total debt in foreign currency, and 10.9% have all of their debt in foreign currency. However, this dispersion is not explained just by home country. Overall, FC debt is used more frequently by firms in the middle-income countries (73.0% of firms vs. 47.2% of firms in high-income countries). On average, FC debt makes up about 33.2% of EA firms' total debt. SLC debt makes up another 8.6%. When examining only firms with foreign debt, the numbers are, of course,

[8] South Korean firms have the lowest operating margin (6.1%), market-to-book (0.93), and business risk (0.033) among firms in the region, results also present in Booth et al. (2001).

Table I

Summary Statistics of Sample Firms in East Asia, 1996

This table reports mean values for some of the variables used in the subsequent analysis. In Panel B, firms are separated by foreign debt issuance. Data are for 1996. Variables are defined in detail in Appendix A. Firms included in the sample are those identified by SBC Warburg Dillon Read as among the largest in their respective home countries. Aggregate measures are provided for high-income and middle-income countries (as defined by the IMF) and for all countries. Chinese "Red Chip" companies are included with Hong Kong Companies. In Panel A correlations with an absolute value greater than 0.09 are significantly different from zero at the 5% level. In Panel B bold text denotes a value statistically greater than the opposing value at the 5% level for a Wilcoxon two-sample test.

Panel A

	Obs.	Total Debt/ Value	Natural Local Debt/ Value	Foreign Debt/ Value	Synthetic Local Debt/ Value	Long-term Debt Percent	Interest Coverage Ratio	Sales (USD millions)	Committed Capex (% Sales)	Operating Margin (%)	Business Risk	Asset Tangibility	Market-to-Book Ratio	Foreign EBIT (%)	Foreign Cash (%)	Average Tax Rate
All countries	327	0.268	0.157	0.089	0.023	57.1%	7.90	1,487.8	32.1%	20.6%	0.082	0.611	2.43	20.1%	10.5%	20.6%
High income	142	0.201	0.141	0.039	0.021	59.0%	8.74	1,049.2	29.9%	20.7%	0.073	0.628	2.28	25.2%	10.5%	16.5%
Hong Kong/ China	62	0.233	0.148	0.056	0.029	62.9%	7.54	1,269.3	48.1%	28.1%	0.089	0.662	2.09	17.6%	12.5%	15.3%
Singapore	40	0.215	0.158	0.031	0.026	53.1%	11.01	722.4	11.5%	17.8%	0.080	0.608	2.33	31.8%	15.3%	24.4%
Taiwan	40	0.135	0.112	0.021	0.002	58.7%	8.25	1,040.3	20.5%	12.1%	0.044	0.596	2.55	30.5%	2.5%	10.6%
Middle income	185	0.320	0.169	0.126	0.024	55.7%	7.27	1,821.5	33.8%	20.5%	0.088	0.597	2.54	16.2%	10.4%	23.6%
Indonesia	40	0.286	0.041	0.177	0.068	60.6%	5.88	615.0	38.7%	21.9%	0.119	0.578	2.22	18.9%	20.8%	20.3%
Malaysia	41	0.165	0.131	0.029	0.006	50.0%	10.76	1,045.6	17.7%	20.3%	0.059	0.602	3.48	6.8%	1.9%	27.3%
Philippines	40	0.223	0.141	0.076	0.006	54.4%	10.91	411.1	56.9%	29.7%	0.136	0.592	2.94	7.8%	7.2%	23.0%
South Korea	35	0.677	0.464	0.213	0.000	50.8%	1.26	6,875.5	11.0%	6.1%	0.033	0.576	0.93	29.0%	10.0%	25.4%
Thailand	29	0.300	0.094	0.163	0.044	64.6%	6.31	602.9	44.7%	23.3%	0.083	0.647	3.03	22.0%	12.7%	21.8%
Correlations																
Natural LC debt/ value		0.773														
Foreign debt/ value		0.590	0.011													
Synthetic LC debt/value		0.145	−0.132	−0.009												
Long-term debt percent		0.107	−0.071	0.216	0.149											
Interest coverage ratio		−0.574	−0.406	−0.345	−0.185	−0.319										
Sales (USD millions)		0.387	0.327	0.223	−0.019	0.012	−0.220									
Committed Capex (% sales)		0.072	−0.035	0.184	−0.029	0.223	−0.037	−0.106								
Operating margin		−0.224	−0.204	−0.101	−0.008	0.179	0.247	−0.218	0.218							
Business risk		0.058	0.080	−0.017	0.017	0.009	0.026	−0.126	0.076	0.354						

Panel A

	Obs.	Total Debt/ Value	Natural Local Debt/ Value	Foreign Debt/ Value	Synthetic Local Debt/ Value	Long-term Debt Percent	Interest Coverage Ratio	Sales (USD millions)	Committed Capex (% Sales)	Operating Margin (%)	Business Risk	Asset Tangibility	Market-to-Book Ratio	Foreign EBIT (%)	Foreign Cash (%)	Average Tax Rate
Asset tangibility		0.089	0.014	0.118	0.032	0.383	−0.202	−0.028	0.203	0.229	0.101					
Market-to-book ratio		−0.507	−0.404	−0.285	−0.078	−0.104	0.441	−0.195	0.017	0.145	−0.074	−0.229				
Foreign EBIT (%)		0.077	−0.055	0.217	−0.019	0.013	−0.015	0.100	0.010	−0.155	−0.048	−0.183	−0.001			
Foreign cash (%)		0.061	−0.159	0.193	0.298	0.095	−0.091	0.069	−0.046	−0.062	−0.040	-0.067	0.031	0.110		
Average tax rate		0.070	0.130	−0.062	0.006	−0.151	0.053	0.170	−0.139	−0.057	0.056	−0.179	0.057	−0.171	−0.105	

Panel B

	Foreign Debt	Obs.	Total Debt/ Value	Natural Local Debt/ Value	Foreign Debt/ Value	Synthetic Local Debt/ Value	Long-term Debt Percent	Interest Coverage Ratio	Sales (USD millions)	Committed Capex (% Sales)	Operating Margin (%)	Business Risk	Asset Tangibility	Market-to-book Ratio	Foreign EBIT (%)	Foreign Cash (%)	Average Tax Rate
All countries	No	125	0.146	0.146			42.7%	**11.85**	685.7	18.6%	21.0%	0.072	0.563	**2.84**	16.7%	3.4%	**21.9%**
	Yes	202	**0.345**	0.164	0.144	0.037	**66.1%**	5.48	**1,985.2**	**40.5%**	20.3%	0.088	**0.641**	2.18	**22.2%**	**14.8%**	19.7%
High income	No	75	0.152	0.152			49.1%	**11.01**	709.1	22.0%	19.7%	0.058	0.577	**2.48**	24.3%	3.6%	**18.3%**
	Yes	67	**0.255**	0.128	0.084	0.044	**70.0%**	6.22	**1,430.6**	**38.8%**	21.7%	**0.091**	**0.686**	2.06	**26.3%**	**18.2%**	14.6%
Hong Kong/	No	26	0.181	0.181			45.8%	**10.84**	588.5	37.1%	26.9%	0.084	0.590	2.33	16.2%	3.7%	16.9%
China	Yes	36	**0.270**	0.125	0.096	0.049	**75.3%**	5.33	**1,742.0**	55.7%	28.9%	0.092	**0.712**	1.92	18.6%	**18.9%**	14.1%
Singapore	No	25	0.169	0.169			49.3%	12.25	717.9	12.0%	18.7%	0.047	0.589	2.38	25.2%	5.6%	26.9%
	Yes	15	**0.291**	0.140	0.082	0.069	**59.6%**	8.95	729.8	10.8%	16.4%	0.129	0.639	2.25	**42.7%**	**31.4%**	20.3%
Taiwan	No	24	0.105	0.105			52.5%	**9.88**	825.6	16.7%	**13.6%**	0.040	0.549	2.76	32.0%	1.5%	10.9%
	Yes	16	**0.184**	0.123	0.056	0.005	**68.1%**	5.63	**1,383.9**	**26.4%**	9.7%	0.050	**0.670**	2.22	28.2%	4.2%	10.2%
Middle income	No	50	0.136	0.136			33.0%	**13.08**	650.9	13.6%	22.9%	0.093	0.542	**3.38**	5.3%	3.2%	**27.3%**
	Yes	135	**0.389**	**0.182**	0.174	0.033	**64.1%**	5.11	**2,258.3**	**41.4%**	19.6%	0.086	**0.618**	2.24	**20.2%**	**13.1%**	22.3%
Indonesia	No	2	0.002	0.002			43.8%	**18.25**	438.7	29.7%	29.6%	0.020	0.549	**3.19**	7.5%	32.7%	19.9%
	Yes	38	**0.301**	0.043	0.187	0.071	61.5%	5.23	624.3	39.2%	21.5%	**0.124**	0.579	2.17	19.5%	20.2%	20.4%
Malaysia	No	29	0.120	0.120			35.7%	**12.36**	971.0	9.7%	20.1%	0.052	0.557	3.71	5.0%	0.0%	**29.0%**
	Yes	12	**0.277**	**0.158**	0.099	0.019	**84.6%**	6.89	1,225.9	**37.2%**	20.7%	0.074	**0.711**	2.92	11.3%	6.4%	23.3%
Philippines	No	16	0.205	**0.205**			33.1%	12.79	175.3	20.6%	26.2%	**0.177**	0.565	2.52	0.4%	0.0%	26.4%
	Yes	24	**0.235**	0.099	0.126	0.011	**68.6%**	9.67	568.3	**81.2%**	31.9%	0.109	0.613	3.21	**12.7%**	**12.1%**	20.7%
South Korea	No	0															
	Yes	35	0.677	0.464	0.213		50.8%	1.26	6,875.5	11.0%	6.1%	0.033	0.576	0.93	29.0%	10.0%	25.4%
Thailand	No	3	0.021	0.021			0.0%	**18.23**	235.8	4.0%	29.4%	0.082	0.266	4.59	33.7%	30.2%	21.8%
	Yes	26	**0.332**	**0.102**	0.181	0.049	**72.1%**	4.93	**645.3**	**49.4%**	22.6%	0.083	**0.691**	2.85	20.7%	10.7%	21.8%

higher; 41.7% of total debt is foreign and 10.7% is synthetic local debt. Hence, together FC and SLC debt compose roughly half of these EA firms' total debt.

The most immediate result in Panel B of Table I is the higher total debt levels of FC debt users. For each individual country and all countries combined, FC debt users have significantly more total debt. The differences are typically economically significant. Total debt ratios for the all-country and middle-income averages are more than twice as large for firms with FC debt: 0.345 for FC debt users versus 0.146 for nonusers across all countries. FC debt users also have a higher percentage of long-term debt in all countries (although in Indonesia, the difference is not statistically significant). For all countries, 66.1% of debt is long term for FC debt users, whereas only 42.7% is long term for nonusers.

As measured by sales converted to USD, FC debt users are consistently larger, and differences are generally also statistically significant. Firms with FC debt also have significantly higher committed capital expenditures in many countries and in aggregate. Finally, FC debt users have more tangible assets in nearly all countries, significantly lower market-to-book ratios (though only the aggregates are reliably different), and higher levels of foreign EBIT and cash reserves.[9] These last results are significant at the aggregate level but vary considerably from country to country.

II. Local and Foreign Currency Debt Use by EA Corporations

A. Theory and Hypotheses

Innumerable empirical studies have tested capital structure theories using samples of U.S.-based firms. Although interpretations differ, a set of stylized facts has emerged. In a widely cited review, Harris and Raviv (1991) conclude that debt use is positively related to fixed assets, nondebt tax shields, investment levels, and firm size and is negatively related to cash-flow volatility, growth opportunities, advertising expenditure, the probability of bankruptcy, profitability, and uniqueness of product. In two recent studies using samples of non-U.S. firms, Rajan and Zingales (1995) and Booth et al. (2001) find that despite substantial institutional differences across countries, firm debt ratios in developed and developing countries seem to be affected by some similar factors.[10] First, debt ratios

[9] We are concerned that higher levels of foreign cash could be from proceeds of foreign bond offerings that have not been utilized or converted to local currency. Anecdotal evidence suggests that the majority of the FC debt was bank debt, which is likely to be immediately utilized, making this less of a concern.

[10] Rajan and Zingales (1995) investigate G-7 countries and Booth et al. (2001) examine developing countries. It should be noted, however, that the interpretation of empirical findings is a matter of debate and that many variables can be considered proxies for factors in competing models. For example, Harris and Raviv (1991) conclude that, "It would be difficult to reject any models based on the available evidence," (p. 350) whereas Rajan and Zingales (1995) conclude "that the theoretical underpinnings of the observed correlations are still largely unresolved" (p. 1458). Since the primary purpose of this paper is not to resolve these differences concerning total capital structure, we present our subsequent results for total debt with limited interpretation and let the reader draw conclusions regarding the implications for existing (aggregate) capital structure theory.

are typically lower for more profitable firms. Second, debt use is generally higher for firms with more tangible assets that can be used as collateral. Firm size is frequently positively related to leverage, while market-to-book ratios are negatively related to debt use (although Booth et al. suggest this may be a country effect in developing countries). In addition, Booth et al. find some evidence of tax-motivated leverage using Miller's (1977) gains-to-leverage formula.

While these papers examine the determinants of total debt, additional insights are needed to explain the decision to use natural local, synthetic local, and foreign currency debt. In this section, we discuss the predictions of existing capital structure theory and also present some new hypotheses based on related theory and prior evidence. (Table II provides a summary of predictions.) We also examine total debt so that our firms can be compared to those in previous studies (e.g., Booth et al. (2001)) and to provide a benchmark for our disaggregated analysis.

A.1. Static Trade-off Theory

The static trade-off theory predicts that leverage should be increasing with benefits of debt (such as the size of tax shields) and decreasing with costs of debt (such as expected costs of financial distress). To measure the size of firms' tax shields, we employ a firm's average tax rate[11] and the country-specific gains-to-leverage formula of Miller (1977). Benefits of tax shields should increase with a firm's profitability. We use operating margin as a measure of profitability. Business risk (as measured by the standard deviation of operating margin) is a proxy for the probability of financial distress. Firm size may also be an inverse proxy for the probability (or proportional cost) of financial distress and therefore be positively related to leverage. The natural logarithm of U.S. dollar sales measures firm size.

The static trade-off theory also makes predictions about the preferred currency denomination of debt. For example, direct costs of debt issuance are likely to vary across markets. The most obvious of these costs is the level of interest rates in the local relative to foreign borrowing markets. Kim and Stulz (1988) suggest that clientele effects can lead to differences in real borrowing costs across markets. Miller and Puthenpurackal (2000) find evidence that foreign firms tend to issue in the Yankee market when the relative interest cost is low. Graham and Harvey (2001) find that 44% of firms responding to their survey report that lower foreign interest rates are "important or very important" in the decision to use foreign debt. We hypothesize that the difference between local and foreign interest rates should be positively associated with the use of FC debt

[11] Graham (1996a, 1996b) argues that an accurate estimate of a firm's marginal tax rate includes factors such as investment tax credits and loss carryforwards and carrybacks, and the alternative minimum tax is the appropriate measure for determining the tax advantage of debt. Unfortunately, data limitations prevent us from constructing such a firm-specific tax variable. As a robustness check, we examine alternatives to the average tax rate suggested by Graham (1996b), such as the statutory tax rate and a taxable income dummy; results are qualitatively similar to those reported for the average tax rate.

Table II

Summary of Theoretical Predictions

This table summarizes theoretical predictions discussed in the text. The second column summarizes predictions for total debt ratios analyzed in Table III. The next three columns summarize predictions for debt-to-value measures for each type of debt analyzed in Table III. Since the predictions for total debt levels in the second column often apply to each type of debt, only specific differences or additional insights are summarized in the these columns (see main text). The last two columns summarize predictions for local currency to total debt ratios (LC/Total debt) and synthetic local currency debt to all local currency debt ratios (SLC/All LC debt).

	Debt-to-Value Predictions (Table III)				Debt Ratio Predictions (Table IV)	
Theory	Total Debt	NLC Debt	FC Debt	SLC Debt	LC/Total Debt	SLC/All LC Debt
Static trade-off theory	Average tax rate (+) Miller gains-to-leverage (+) Operating margin (+) Business risk (−) Sales (+) Interest rate diff. (−)	Interest rate diff. (–)	Interest rate diff. (+)	Interest rate diff. (−) Family affiliation (+)	Interest rate diff (−) Business risk (+)	Interest rate diff (−) Family affiliation (+)
Costly monitoring and agency theory	Asset tangibility (+) Market-to-book (−) Committed Capex (+) Operating margin (+/−) Sales(−) Foreign equity listing (+) Family affiliation (+)	Asset tangibility (+/−) Foreign equity listing (−)	Asset tangibility (+) Market-to-book (−) Foreign equity listing (+) Family affiliation (+)		Asset tangibility (−) Market-to-book (+) Family affiliation (−) Foreign equity listing (−)	
Pecking order hypothesis	Operating margin (−)	Operating margin (−)	Foreign equity listing (−)		Operating margin (−)	Foreign equity listing (−)

	Debt-to-Value Predictions (Table III)				Debt Ratio Predictions (Table IV)	
Theory	Total Debt	NLC Debt	FC Debt	SLC Debt	LC/Total Debt	SLC/All LC Debt
Market depth hypothesis	Foreign equity listing (−) Foreign currency debt (+) Sales (−)	LT debt % [FC-LC] (−)	Sales (+) Committed Capex (+) Foreign equity listing (+) LT debt % [FC-LC] (+)	Sales (+) Committed Capex (+) Foreign equity listing (+)	Foreign equity listing (+) Sales (−) Committed Capex (−) Foreign equity listing (−) LT debt % [FC-LC] (−)	Sales (+) Committed Capex (+) Foreign equity listing (+)
Risk Management	Foreign EBIT (+) Foreign cash (+)		Foreign EBIT (+) Foreign cash (+)	Foreign EBIT (−) Foreign cash (−) Sales (+/−) Operating margin (−) Market-to-book (+)	Foreign EBIT (−) Foreign cash (−)	Foreign EBIT (−) Foreign Cash (−) Sales (+/−) Operating margin (−) Market-to-book (+)

and negatively related to the use of local currency (NLC and SLC) debt.[12] Likewise, the interest rate differential should be negatively related to both the ratio of local currency (NLC and SLC) debt to total debt and the ratio of SLC debt to all LC debt.

The trade-off between foreign versus local currency debt could also be motivated by differences in tax treatment (see Hodder and Senbet (1990)). Several studies have examined the use of foreign debt by U.S. multinationals as it relates to international tax issues. For example, Newberry and Dhaliwal (2001) find that debt location is determined in part by jurisdiction-specific tax-loss carryforwards and limitations on foreign tax credits. Foreign debt may also allow for income shifting between multinational subsidiaries. Graham (2001) provides a summary of the incentives for U.S. multinationals to use foreign debt. It is difficult to identify variables that would be directly related to potential tax benefits of foreign currency debt since we do not have detailed information on the debt's currency, whether it is directly a liability of the firm or instead a liability of a foreign subsidiary, or due to the availability of foreign tax credits. Furthermore, since some of the debt could be foreign currency debt issued in the local market (e.g., by local or foreign branch banks), these issues may not even be relevant to some firms in our sample that are identified as FC debt users. Lastly, we are not aware of any significant special tax treatment of foreign debt in our East Asian countries, yet it may be that firms can undertake some type of tax arbitrage that we have not been able to identify. If this is the case, a specific prediction is again difficult since firms with greater *potential* tax liabilities (rates) may seek additional tax arbitrage opportunities with foreign debt and therefore report lower *actual* taxes paid (i.e., have a lower average tax rate).

Firms must undertake an additional costly transaction in the derivatives market in order to create SLC debt. We therefore predict that proxies related to the costs of derivatives, such as bid–ask spreads and trading volume, should affect the usage of SLC debt. Anecdotal evidence also suggests that firms with a family affiliation may have closer relationships with dealers or a family member bank that facilitates access to the derivatives market, implying more SLC debt for such firms.

A.2. Costly Monitoring and Agency Costs of Debt

Because managers and investors generally have differing information sets, investors must undertake costly monitoring activities. Thus, agency theory makes a set of predictions for optimal capital structure. Tangible assets acting as collateral for loans should be positively related to debt use, since they can be used to reduce agency costs of debt such as risk-shifting costs. We use fixed assets as a percent of total assets as a proxy for asset tangibility. (Committed capital expen-

[12] The use of derivatives in perfect capital markets converts foreign currency (risk-free) interest rates to local currency (risk-free) interest rates. If there exist differences in credit spreads across markets that are not priced into derivative contracts, then there can still be differences in real borrowing costs between NLC and SLC debt. Unfortunately, we do not have complete firm-level data on LC and FC credit spreads.

ditures for the next 12 months as a percent of sales may also act as a proxy for asset tangibility; the pairwise correlation is 0.203.) Firms with greater growth opportunities should use less debt to avoid underinvestment costs related to debt-overhang problems as described by Jensen and Meckling (1976) and Myers (1977). We use the market-to-book value of equity as a measure of growth opportunities. Agency theory predicts that the relation between profitability and leverage depends on the effectiveness of the market for corporate control. If governance is effective, Jensen (1986) predicts that profitable firms will use more leverage as a commitment device for paying out free cash flow. Likewise, ineffective governance should motivate managers to avoid the disciplinary incentives of higher leverage. Firm size may also be related to leverage for agency reasons; to the extent that size proxies for the relative amount of information available to outside investors, investors in large firms should prefer relatively more equity to debt.

Agency theory and the need for lender monitoring may also determine the preferred level of foreign currency debt. The arguments of Diamond (1984) imply that if local lenders can gather information on local firms at a relatively low cost, firms with high monitoring costs should borrow relatively more locally. Anecdotal evidence suggests that foreign lenders prefer loans associated with hard assets because of the high costs of monitoring EA borrowers. Consequently, we predict a positive relation between asset tangibility (and perhaps committed capital expenditures) and the level of FC debt, and a negative relation with the ratio of LC debt to total debt. If information asymmetries, and therefore potential agency costs, are larger for firms with greater growth potential, then such growth firms (as proxied by high market-to-book ratio) will get relatively better terms, and therefore borrow more from local lenders.

Agency costs of debt can also lead to a signaling explanation for the use of foreign debt. Extending the logic of Ross (1977), if it is costly for a firm to use foreign capital in terms of increased regulatory scrutiny or distress costs, then firms can credibly signal their creditworthiness by accepting these potential costs. A related signaling theory by Titman and Trueman (1986) implies that a firm may choose to obtain debt from a high quality (possibly foreign) lender to signal firm quality to other outside investors. For this reason, we expect that firms that have agreed to additional scrutiny and developed a reputation in foreign markets via a foreign equity listing are also more likely to use FC debt. Such a listing is also correlated with higher firm-level corporate governance standards, which can increase the reputation capital of the firm (see, e.g., Diamond (1989), Klapper and Love (2002), and Lins, Lang, and Miller (2002)). In addition, given that firms with a foreign equity listing would have already paid any fixed costs associated with entering foreign capital markets, this may also decrease the marginal cost of issuing FC debt.

Finally, prior research suggests that family or group affiliation, which often includes an ownership or preferred relationship with a related bank, may be a factor in determining total debt levels. Such a main-bank relationship has been shown to improve a firm's access to external capital and promote investment (see Hoshi, Kashyap, and Scharfstein (1990) and Claessens, Djankov, and Klapper

(2002)). Other studies (see Brailsford, Oliver, and Pua (2001) and Wiwattanakantang (1999)) find a significantly positive relation between large block shareholders, such as family or group ownership, and leverage in Australia and Thailand, respectively. These studies support the theory that large shareholders have more incentive to monitor management, thereby lowering agency conflicts. Therefore, we expect that family-affiliated firms across East Asia should have a higher level and proportion of FC debt.

A.3. Pecking Order Hypothesis

The pecking order hypothesis of Myers and Majluf (1984) suggests that firms prefer to finance with internally generated funds, then with external debt, and finally with external equity. This theory predicts a negative relation between profitability and leverage, since more profitable firms have less of a need to access lending markets. Contrary to the signaling theory noted above, the pecking order hypothesis suggests that (by revealed preference) firms with a foreign equity listing are likely to have obtained as much debt as desired and have moved down the pecking order to raise additional external funds in the equity markets.

The pecking order hypothesis may extend to the preferred currency denomination of financing if local investors have better information than foreign investors. This implies that firms would first choose LC debt, then FC debt. Once debt markets are exhausted, firms would turn to local equity markets and then finally to foreign equity markets. Thus, the relation between profitability and leverage should be strongest for LC debt, and, hence, we expect profitability to be negatively related to the ratio of LC debt to total debt. Similarly, firms with foreign equity may have already moved down the pecking order and therefore be expected to have lower levels of local and foreign currency debt. It is difficult to make predictions about the placement of SLC debt in the pecking order since creation of SLC debt may be a decision that managers can make independent of the borrowing decision. Yet in some cases, lenders require firms to hedge currency risk or hold cash reserves as part of the loan agreement, and firms may find this added constraint costly. As a consequence, SLC debt is likely below FC debt in the pecking order, and we predict a negative relation between a foreign equity listing and the ratio of SLC debt to all LC debt. Perhaps the most direct implication of the pecking order hypothesis is that FC debt will appear as a complement to local debt (unlike the prediction of the trade-off theory that implies it is a substitute) since firms will use FC debt only after exhausting LC debt.

A.4. Market Depth Hypothesis

Published anecdotal evidence and our discussions with EA capital market participants give rise to a *market depth hypothesis*. If local currency debt markets are not sufficiently large or deep enough to satisfy the demands of borrowers, firms with access to foreign currency lending will seek out such funds. Thus, firms that are able to access foreign debt markets will, on average, have higher total leverage. The lack of market depth is a popular explanation for FC and SLC debt use by

EA firms.[13] Firm size and committed capital expenditures are likely proxies for the probability of exhausting LC lending markets.

Another aspect of the choice regarding currency denomination is the role of preferred maturity structure. Generally, EA public debt markets have a very limited number of issues with an original maturity greater than 5 years, which suggests that the costs of issuing local long-term debt are high. Still, firms may prefer long-term debt for a variety of reasons (see Barclay and Smith (1995)). As a consequence, firms may have an incentive to use FC debt as a mechanism for obtaining long-term debt. Ideally, we would like to analyze the maturity structure of NLC, FC, and SLC debt. Unfortunately, precise data concerning the effective maturity of derivative contracts are not available. Even if these data were available, it may not be possible to accurately describe the intentions of managers, since anecdotes suggest that many firms intended to hedge currency risk associated with long-term debt by rolling over short-term derivative positions. However, we are careful to control for the maturity structure of debt to ensure that the effects we measure are not driven by factors that motivate maturity structure instead of currency preference.[14] We examine two control variables for maturity structure. First, we calculate the percentage of total debt that is long term (more than 1 year to maturity). We predict that firms with long-term debt will have more FC debt. Second, we take the difference between the percentage of debt originally denominated in FC that is long term minus the percentage of debt originally denominated in local currency that is long term.[15] We predict that this variable is negatively related to NLC debt levels and positively related to FC debt levels.

A.5. Risk Management Theory

An important aspect of foreign currency debt is the exposure it creates to exchange rate fluctuations. We hypothesize that firms that can mitigate exchange rate risk or bear it at a low cost use more FC debt (see Leland (1998) and Graham and Rogers (2002)). Specifically, firms with higher foreign EBIT will use more FC debt since foreign cash flow provides a natural exchange-rate hedge. Likewise, firms could keep cash reserves in foreign currency as a buffer against exchange

[13] See Cooke and Seto (1997) and Euromoney Treasury Management (1993).

[14] We thank the referee for pointing out this possibility.

[15] Intuitively, this variable measures the difference in maturity between foreign and local currency debt. For firms without any original issue foreign currency debt, we set the variable equal to zero. Consistent with the hypothesis that firms use FC debt to obtain more long-term debt, the variable has a mean value of 0.15. We are concerned about including maturity variables in the specification in Tables III and IV because the long-term debt percent is likely to be determined jointly with the dependent variables and is correlated with other explanatory variables. Therefore, we only report results with the second control variable in these tables. In the performance analysis we use the percentage of long-term debt. With the exception of the implications for asset tangibility (which has been shown by prior studies to be closely related to debt maturity structure) the results are unchanged. Complete tables with both control variables are available on request.

rate movements; hence, we hypothesize a positive relation between foreign cash holdings and FC debt levels.[16] Firms with other motivations for using foreign currency debt, but without significant foreign EBIT or cash holdings, should be more likely to hedge out the currency risk with derivatives (i.e., use SLC debt). Corporate risk management theory also suggests that certain types of firms are more likely to manage foreign exchange risk with derivatives (see Smith and Stulz (1985) and Froot, Scharfstein, and Stein (1993), among others). For example, high growth firms should be more likely to manage financial risk in an attempt to guarantee that funds are available for investment. Smaller firms have greater proportional costs of financial distress, and less profitable firms have a higher probability of encountering financial distress. On the other hand, larger firms should be more likely to use derivatives in the presence of significant fixed costs of hedging.

B. Results

B.1. Total Debt

In this subsection, we provide a brief discussion of the determinants of total debt as a benchmark for our subsequent disaggregated analysis. Panel A of Table I shows that, similar to other studies, correlations between several of the variables described above and total debt are consistent with predictions of capital structure theory. For example, total leverage is positively correlated with size and negatively correlated with the market-to-book ratio and operating margin. Results from multivariate tests are reported in Table III. Coefficients in column 1 are consistent with findings in previous studies that total debt ratios are positively related to the country-specific tax advantage and firm size as well as negatively related to the market-to-book ratio and operating margin. Thus, these results support predictions made by the static trade-off theory, agency costs theory, and the pecking order hypothesis. The negative coefficient for the interest rate differential also supports the static trade-off theory. Yet, similar to Booth et al. (2001), we find no significant relation between total debt level and either the average tax rate or business risk. Asset tangibility is also not significantly related to the total debt ratio. This suggests that collateral may be less important in countries with weak bankruptcy laws and repossession enforcement like the East Asian countries in our sample (see Claessens et al. (2002)). On the other hand, if committed capital expenditure is a better proxy for asset tangibility than fixed assets, the positive coefficient on this variable supports the role of collateral in determining debt levels.

Consistent with empirical evidence in Bris, Koskinen, and Pons (2001), foreign EBIT is significantly positively related to total debt levels. However, we find no association between total debt and the dummy variable signifying association with a family group. This is surprising given the important influence of family

[16] For a detailed discussion of alternative risk management practices, see Géczy, Minton, and Schrand (2000) and Petersen and Thiagarajan (2000). Opler et al. (1999) discuss the relation between cash reserves and financial risk.

Table III

Determinants of Debt-to-Value Ratios

This table presents results from regressions using all sample firms with sufficient data. Column 1 presents results from an OLS regression with total debt divided by firm value in 1996 as the dependent variable. Columns 2–4 present results from TOBIT regressions with type of debt described divided by firm value in 1996. Independent variables are defined in detail in Appendix A. One-digit SIC dummy variables are also included in the estimation. Coefficients (Coef.) and heteroskedasticity consistent standard errors (*SE*) are reported. The estimation for synthetic local currency debt includes only firms with foreign debt since this is a precondition for synthetic local currency debt and excludes South Korean firms that are prevented by law from using derivatives (and therefore SLC debt).

	Dependent Variable: Debt-to-Value Ration							
	(1)		(2)		(3)		(4)	
	Total Debt		Natural Local Currency Debt		Foreign Currency Debt		Synthetic Local Currency Debt	
Independent Variables	Coef.	*SE*	Coef.	*SE*	Coef.	*SE*	Coef.	*SE*
Constant	0.114	0.124	0.102	0.120	−0.603	0.143	0.217	0.057
Average tax rate	0.047	0.077	0.030	0.077	−0.062	0.083	0.095	0.117
Miller gains-to-leverage	0.396***	0.068	0.356***	0.068	0.020	0.075	0.140	0.122
Operating margin	−0.227***	0.066	−0.271***	0.066	−0.005	0.075	0.080	0.095
Business risk	−0.022	0.071	0.000	0.070	0.100	0.077	−0.008	0.077
Sales (log, USD)	0.019**	0.009	0.017**	0.008	0.041***	0.009	−0.024*	0.014
Interest rate differential	−1.122***	0.425	−1.209***	0.420	1.505***	0.484	−1.639**	0.696
Asset tangibility	−0.002	0.052	-0.014	0.052	0.136**	0.059	0.080	0.077
Market-to-book	−0.049***	0.006	-0.034***	0.006	−0.035***	0.007	0.004	0.009
Committed Capex/sales	0.040***	0.015	0.013	0.015	0.053***	0.014	-0.016	0.020
Foreign equity listing (dummy)	−0.029	0.020	0.015	0.020	−0.058***	0.023	0.003	0.030
Family affiliation (dummy)	−0.016	0.022	−0.026	0.022	−0.003	0.024	0.003	0.031
Foreign EBIT (% Value)	0.526**	0.230	0.284	0.227	0.721***	0.260	−1.398**	0.666
Foreign Cash (% Value)	−0.058	0.179	−0.310*	0.175	0.590***	0.179	−0.130	0.236
Long-term debt percent (FC-LC)	−0.005	0.031	−0.081***	0.029	0.152***	0.029	−0.023	0.036
Foreign currency debt (dummy)	0.115***	0.024						
Number of observations	315		315		315		162	
Left censored			34		138		96	
Adjusted *R*-squared	52.0%							

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, in a two-tailed test against a null of 0.0 (using a Wald chi-squared test for the TOBIT regressions).

affiliation for main bank relationships in East Asia (see Lemmon and Lins (2001), among others). Finally, we include a dummy variable that equals one if the firm has FC debt to test for the market depth hypothesis. The coefficient on this variable is positive, consistent with the hypothesis that local debt markets were

insufficiently deep for at least some firms. The size of this effect is large. All else being equal, firms with FC debt have a debt-to-value ratio about 0.10 greater than firms without FC debt. Finally, we note the high explanatory power of this regression as measured by adjusted R-squared of 52%.

Coefficients on one-digit SIC dummies (not reported) show no significant industry effects in our sample that cannot be explained by other factors. With the exception of size, the results are robust to the inclusion of country dummies instead of country-specific variables (results not reported). The coefficients on the country dummies suggest that Korean firms have significantly more debt after accounting for firm-specific factors.

B.2. NLC, FC, and SLC Debt

In our analysis of debt type, we utilize a TOBIT specification with debt-to-value ratios as the dependent variables. We use such a specification because not all firms issue all types of debt (i.e., we have a point mass at zero for each type of debt). We estimate two types of regressions. The first set, discussed here, is from a one-step analysis and includes only variables assumed to be exogenous. The second is a simultaneous-equations TOBIT model similar to that of Nelson and Olson (1978), addressing endogeneity related to the debt-to-value ratios. Details of these specifications and some results are presented in Appendix B. In general, the results presented in the appendix are similar to the results from the simpler analysis reported in Table III. Because of the strong assumptions needed for inference with simultaneous-equation TOBIT models, we discuss them here only where they provide additional insight or differ significantly from the one-step specification.

Table III (columns 2–4) reports estimates from the one-step TOBIT regressions.[17] Column 2 shows results on the determinants of natural local currency debt. The country-specific variable representing Miller's gains-to-leverage is positive and significant, suggesting that EA companies consider the tax-advantages of local debt. (However, the coefficient is no longer significant in the alternative specification reported in Appendix B.) Consistent with the static trade-off theory, firm size is positively related to local debt levels, while both operating margin and the market-to-book ratio are strongly negatively related, consistent with the pecking order and agency theory. The interest rate differential between the local currency and LIBOR is negatively related to NLC debt levels as predicted by the static trade-off theory. In general, local debt appears to be affected by as many similar factors as total debt.

Evidence that firms seek foreign lending markets to extend the maturity structure is provided by the negative coefficient on the variable measuring the difference between foreign and local long-term debt percentages. Specifically, firms

[17] Although we do not include country dummy variables in these regressions so that we can examine the impact of alternative country-specific variables (e.g., Miller gains-to-leverage, interest rate differential, etc.), we standardize firm-specific explanatory variables by subtracting their respective country medians. In alternative specifications we have employed country dummies without significant qualitative changes in our results (results not reported, but briefly discussed in text).

with a higher proportion of long-term foreign debt use less NLC debt. The role of foreign debt as it relates to local debt use is directly addressed by the specification reported in Appendix B. In this specification, we find that FC debt levels do not explain NLC debt levels, yet there is a strong negative relation between SLC and NLC debt, indicating that SLC debt and NLC debt are substitutes. We also note that, controlling for the extent of FC debt usage reduces the effect of variables that we predict would primarily affect FC debt usage, such as foreign cash and differences in maturity.

There are not significant industry effects for NLC debt levels. The coefficient on the financial services and real estate (SIC6) dummy is somewhat larger than others but not statistically different at conventional levels.[18] We also reestimate the model using country dummies instead of the country-specific variables. In this specification, Korean firms use significantly more local debt. While most findings are very similar, this reduces the coefficient on sales so that it is no longer statistically significant, again suggesting that size effects are at least partly country specific.

The third column of Table III reports results on the determinants of FC debt. Overall, the findings support several of the theoretical arguments for FC debt use. Direct costs of debt issuance are an important determinant of foreign debt, as suggested by the significant positive coefficient on the interest rate differential. Consistent with costly monitoring and agency theory, the coefficient on asset tangibility is positive and the coefficient on the market-to-book ratio is negative. In support of the market depth hypothesis are the highly significant and positive coefficients on size, committed capital expenditures, and long-term debt percent. Access to foreign equity markets, as measured by the foreign listing dummy variable, is negatively related to foreign debt levels. Recall that this may be a revealed preference for equity as suggested by the extended pecking order hypothesis. As predicted by the risk management theory, both foreign EBIT and foreign cash reserves are significantly positively related to foreign debt levels. Finally, we find no significant relation between FC debt levels and the average tax rate, business risk, operating margin, family affiliation, and the country's tax gains to leverage.

As with NLC debt, industry effects (coefficients not reported) are not significant except for financial services and real estate firms (SIC6), which use somewhat less FC debt. Inclusion of country dummies (also not reported) instead of country-specific variables reveals that Indonesian and Thai firms use significantly more FC debt. This change leaves the sign and significance of most other coefficients unchanged—the exception being the foreign equity listing dummy variable, which is no longer statistically significant. Results correcting for endogeneity reported in Appendix B show similar relations, though there are minor differences.[19] Finally, both NLC and SLC debt are positively related to FC debt

[18] In all, there are 35 firms in our sample that are classified as SIC6 (e.g., real estate management and financing). We have also estimated all equations excluding these firms and the results are nearly identical.

[19] For example, in this specification the average tax rate becomes statistically significant. This provides some evidence that FC debt users may be able to undertake a tax arbitrage (hence the negative coefficient on the average tax rate). Also, asset tangibility is not statistically significant.

levels, again suggesting that local debt (both natural and synthetic) and foreign debt are complements.

The final column of Table III shows estimation results for SLC debt. We limit the sample used in this estimation to firms with foreign debt, since this is a precondition for having SLC debt. We also exclude South Korean firms, as they were legally prevented from using currency derivatives. This reduces the sample by roughly half. The statistically significant results are limited and seem only to support the static trade-off theory and risk management theory. The negative coefficient for the interest rate differential suggests that firms use less SLC debt as the (perceived) effective interest rate on SLC debt increases relative to that for FC debt. Foreign EBIT is negatively related to SLC debt use, suggesting that firms less able to service FC debt with foreign cash flows use more SLC debt (i.e., are more likely to hedge). The negative coefficient on sales is consistent with smaller firms more actively managing foreign exchange risk as they are faced with proportionally higher bankruptcy costs (see Warner (1977)).

Wholesale trade and retailing firms (SIC5) use significantly more SLC debt than firms in most other industries. Replacing the country-specific variables with country dummies reveals that Philippine firms have significantly less synthetic local debt than similar firms in the region. Correcting for endogeneity (Appendix B) shows that NLC debt levels do not explain SLC debt levels, but that there is a positive effect of foreign debt levels on SLC debt use. Hence, the more foreign debt a firm uses, the more likely it is to convert some of it to SLC debt.

Other research (see Johnson et al. (2000)), as well as our own hypotheses, suggests that additional country factors could be important in explaining cross-country differences in EA firm financial factors. We examine a large set of country factors such as creditor rights, judicial efficiency, legal origin, GDP per capita, international country risk, percentage of family-related businesses, and foreign bank presence (results not reported). These variables do not have additional explanatory power for our sample beyond that provided by the interest rate differential and the Miller tax gains-to-leverage. Factors related specifically to the derivatives market, such as measures of the spread on near-term FX forward contracts and derivative market trading volume in 1996, also do not provide additional explanatory power, even for the use of SLC debt.

We also test the predictions regarding the ratios of certain types of debt. Examining ratios is important for two reasons. First, it is possible that the analysis in levels confounds identification of factors that affect the mix of debt differently than the level of debt (such as size, operating margin, and market-to-book). Second, there may be factors related to the extent of debt use that are not modeled and cause the debt-to-value equations to be misspecified. Examining debt ratios can mitigate these problems and more accurately reveal factors that affect a firm's choices concerning the mix of debt types.

Table IV shows results from TOBIT regressions on the determinants of all local currency debt (i.e., NLC plus SLC) as a percent of total debt (first column) and SLC debt as a percent of all local currency debt (second column). Recall that the last two columns of Table II summarize the predictions for these tests. The results and conclusions are generally consistent with those from Table III. In the first

Table IV
Type of Debt Ratios

This table presents results from TOBIT regressions using all sample firms with sufficient data. In column 1 the dependent variable is the ratio of the value of local debt to all debt in 1996. In column 2 the dependent variable is the ratio of the value of synthetic local debt to all local debt. Independent variables are defined in detail in Appendix A. One-digit SIC dummy variables are also included in the estimation. Coefficients (Coef.) and standard errors (*SE*) are reported. The estimation for synthetic local currency (column 2) includes only firms with foreign debt, since this is a precondition for synthetic local currency debt and excludes South Korean firms that are prevented by law from using derivatives (and therefore synthetic local debt). Fewer observations are available for this analysis as compared to Table 4 since some firms have either no debt or no local currency debt.

	(1)		(2)	
	Local Currency Debt to All Debt Ratio		Synthetic Local Debt to All Local Debt Ratio	
Variable	Coef.	*SE*	Coef.	*SE*
Average tax rate	0.311	0.235	0.180	0.546
Miller gains-to-leverage	0.136	0.208	0.369	0.548
Operating margin	− 0.074	0.214	0.622	0.432
Business risk	− 0.311	0.221	− 0.169	0.353
Sales (log, USD)	− 0.079***	0.026	− 0.117**	0.064
Interest rate differential	− 4.503***	1.358	− 6.395**	3.127
Asset tangibility	− 0.446***	0.167	0.549	0.360
Market-to-book	0.038**	0.019	0.076**	0.042
Committed Capex/sales	− 0.137***	0.045	− 0.012	0.100
Foreign equity listing (dummy)	0.121*	0.064	− 0.078	0.139
Family affiliation (dummy)	− 0.028	0.070	0.085	0.141
Foreign EBIT (% value)	− 1.701**	0.720	− 2.123	3.019
Foreign cash (% value)	− 1.539***	0.505	− 0.366	1.026
Long-term debt percent (FC-LC)	− 0.597***	0.086	0.165	0.175
Intercept	2.283***	0.400	0.957	0.955
Number of observations	302		145	
Left censored	17		79	
Right censored	125		4	

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, in a two-tailed test against a null of 0.0 using a Wald chi-squared test.

column, the negative coefficients on sales, committed capex, and long-term debt percent (FC-LC) support the market depth hypothesis. Consistent with costly monitoring and agency cost theory are the negative coefficient on asset tangibility and the positive coefficient on market-to-book. The significant negative coefficients on foreign EBIT and foreign cash support the risk management theory.

The second column of Table IV presents additional evidence in support of the risk management orientation of synthetic local debt. As predicted by risk management theory, the coefficient on sales is negative and the coefficient on market-to-book is positive. The coefficients on foreign EBIT and foreign cash

reserves are still negative, although not significant, in this specification. Finally, the negative coefficient on the interest rate differential again suggests that the trade-off between financial risk and financing costs motivates use of SLC debt.

Given the results from prior research, it is surprising that the family affiliation dummy variable is nowhere a significant predictor of debt use.[20] More detailed ownership data are available for a subsample (242) of our firms. In alternative specifications (not reported), we also include the percent of each company owned by the five largest shareholders and a dummy variable equal to one for a pyramid ownership structure. However, the results do not provide additional insights.

Overall, the results in Tables III and IV paint a clear and consistent picture of the use of NLC, SLC, and FC debt use by EA firms. NLC debt use is generally determined by the same factors that explain total debt use, consistent with existing theories of capital structure. EA firms with significant capital needs (because they are large or have capital intensive projects) use more foreign currency debt because local currency debt markets are not sufficiently deep. Likewise, FC debt use is also motivated by better availability of long-term debt. The ability to manage financial risk is also an important determinant of FC and SLC debt use. Firms appear to use foreign cash flows and cash holdings as natural hedges for exchange-rate risk associated with FC debt. Factors explaining SLC debt usage are similar to factors predicted by risk management theory for explaining derivative use, such as the cost of servicing and hedging FC debt. In addition, many firms apparently seek lower borrowing costs in foreign currency although it is clear that FC debt is not a substitute for NLC debt. Finally, firms' use of foreign currency debt is also related to proxies for agency costs, such as asset tangibility, suggesting that foreign lenders prefer loans associated with hard assets.

III. Debt Type and Firm Performance during the Asian Crisis

A. *East Asia in the Late 1990s*

The EA financial crisis is in several ways an unusual event in economic and exchange rate history. As late as 1 year prior to the crisis, most equity and foreign exchange markets showed little sign of the impending calamity. We define three periods (fixed for all countries) that describe the general state of financial markets around the crisis: Pre-crisis (June 29, 1996 to June 27, 1997), intra-crisis (June 28, 1997 to June 26, 1998), and post-crisis (June 27, 1998 to June 25, 1999).[21] Figure 1 plots USD exchange rates from July 1996 to July 1999 for all of the countries in our sample and shows that rates exhibited little (if any) variation in the

[20] See, for example, Claessens et al. (2002), Claessens et al. (2000), and Hoshi et al. (1990).

[21] Because all countries were not struck simultaneously, these dates are somewhat arbitrary. However, this interval classification includes all of the significant exchange rate depreciation in the "crisis" period. Furthermore, each period is 1 year long, which facilitates the use of annual accounting data in the subsequent analysis. The break at the end of June is also convenient since it allows time for the reporting of the previous year's financial results.

Table V
Stock Market Returns

This table reports average holding-period equity index returns as reported by DataStream for the major domestic market index. The pre-crisis period is from June 29, 1996 to June 27, 1997. The crisis period is from June 28, 1997 to June 26, 1998. The post-crisis period is from June 27, 1998 to June 25, 1999. Each subperiod contains 52 weeks. Middle income and high income are as defined by the IMF. Aggregates are equal-weighted arithmetic means of individual countries.

	Pre-Crisis	Crisis	Post-Crisis
All countries	– 6.1%	– 51.5%	75.4%
High income	16.0%	– 38.9%	50.2%
Hong Kong	39.8%	– 52.8%	48.3%
Singapore	– 16.7%	– 38.0%	85.1%
Taiwan	24.9%	– 25.9%	17.3%
Middle income	– 19.4%	– 59.1%	90.6%
Indonesia	14.8%	– 55.4%	50.1%
Malaysia	– 9.9%	– 67.4%	65.9%
Philippines	– 18.9%	– 44.5%	38.8%
South Korea	– 20.1%	– 62.8%	192.2%
Thailand	– 62.9%	– 65.4%	105.8%

pre-crisis period. Annual exchange rate volatility, as measured by the standard deviation of weekly percent changes in exchange rates versus the USD, is correspondingly very low across the region. For no country does pre-crisis exchange rate volatility exceed that of the Japanese yen against the USD. Table V shows equity market returns for the eight EA countries in our sample. In the pre-crisis period, equity returns in the region were mixed, but only Thailand and South Korea showed a decline of more than 20%.

On July 2, 1997, the Bank of Thailand announced a managed float of the baht and called on the International Monetary Fund for "technical assistance." This announcement effectively devalued the baht by about 20% and is considered a trigger for the Asian crisis. (See http://www.stern.nyu.edu/~nroubini/ for a detailed timeline of the Asian crisis.) Soon after the baht depreciation, other EA currencies followed (see Figure 1), succumbing to the so-called devaluation "contagion." By the end of 1997, the Thai baht, Malaysian ringgit, Indonesian rupiah, South Korean won, and Philippine peso were all down more than 30% against the USD; the Singapore dollar and Taiwan dollar each declined about 15%. Only Hong Kong and China were able to maintain a stable exchange rate against the USD. During this period, exchange rate volatilities increased more than 10-fold and equity markets across the region slumped an average of 51.5%.

By the middle of 1998, the worst of the currency crisis was over, exchange rates stabilized, and equity markets started to rebound. During the post-crisis period, local currencies tended to appreciate somewhat against the USD. (Singapore showed a slight decline, Hong Kong and China retained their pegs despite attacks by speculators, and Malaysia instituted strict currency controls.) Exchange rate volatilities against the USD moderated (averaging less than for the

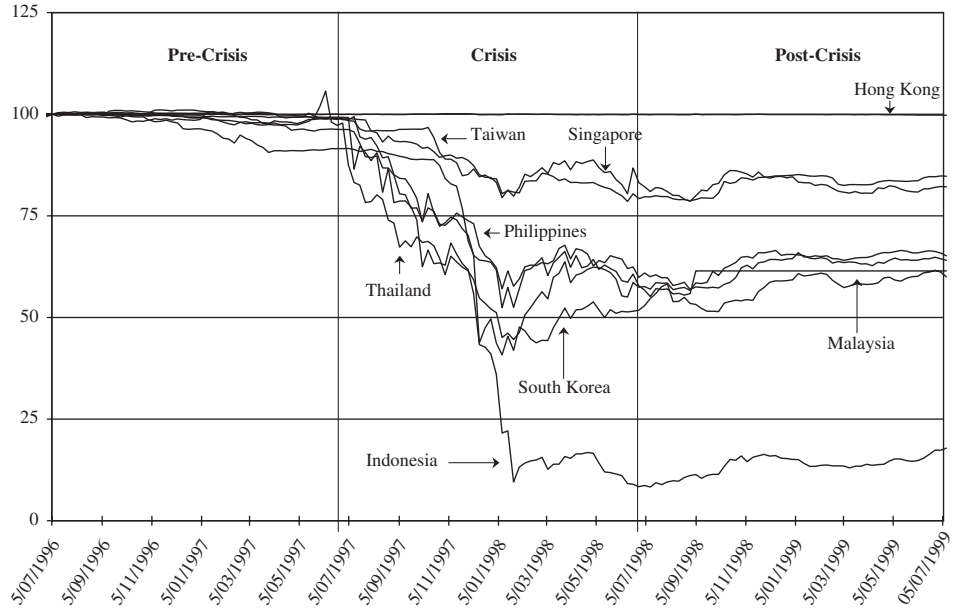

Figure 1. U.S. dollar exchange rates. U.S. dollars per foreign currency unit; weekly data; indexed to the week ending July 5, 1996 = 100.

Japanese yen over the same period) and equity markets in all countries rebounded significantly, up an average of 75.4%.

Except for Hong Kong and China, all of the countries in our sample experienced exchange rate depreciations during the 1997 Asian financial crisis. For this reason, our sample offers a unique opportunity to examine the relative risks of different types of debt during a financial crisis. Specifically, we seek to disentangle the relative influence of debt type on financial and operating performance during the crisis. For example, if firms had unwisely used excessive amounts of foreign debt prior to the currency crisis, as Krugman (1999) and Aghion, Bachetta, and Banerjee (2001) suggest, then these firms should perform relatively worse during or after the exchange rate depreciation. On the other hand, if SLC debt is used as a hedge against foreign debt exposure, as our results in the previous section suggest, then one might expect a significantly less negative relation between SLC debt use and firm performance. Some existing anecdotal evidence is suggestive of such a relation for EA firms.[22] Finally, because our data include estimates of the net financial exposure related to foreign debt (i.e., unhedged foreign debt minus foreign cash reserves), we can calculate the part of the change in a firm's equity value that is directly the result of an increase in foreign financial liabil-

[22] See Shrieve (1999, p. 5). See also Allayannis and Weston (2001) for evidence suggesting a positive relationship between the use of FX derivatives and firm value in a sample of U.S. multinationals exposed to FX risk.

ities (or rarely, assets). This calculation provides some insights into whether or not the equity markets overreacted, as some observers have suggested.[23]

B. Financial and Operating Performance

We break performance measures into two groups: One group measures primarily financial performance and the other, operating performance. Financial performance measures include the excess equity return during the crisis period, the interest coverage ratio in the post-crisis period, and the modified Altman's *Z*-score (see Altman (2000)) in the post-crisis period. Operating performance measures include the changes from fiscal years 1996 to 1998 in the logarithm of sales, operating margin and net property, plant, and equipment (PPE), standardized by sales.

On average, the equity market performance of an EA firm should be adversely affected by all types of debt during the financial crisis. This negative relation is expected simply due to the "leverage effect" of debt (see Modigliani and Miller (1958)) and the negative equity returns experienced during the crisis). Market performance is measured by calculating a firm's total stock market return during the crisis period less the local market index return during the same period. This is a measure of relative firm performance as we correct for overall country returns. The interest coverage ratio (total EBIT divided by total interest expense) is widely used as a measure of financial condition in the financial distress literature (see Andrade and Kaplan (1998) for a discussion). Altman, Hartzell, and Peck (1995) find a modified version of the Altman (1968) *Z*-score useful in predicting financial distress among Mexican firms that had issued Eurobonds denominated in U.S. dollars. Details of the calculation are provided in Appendix A. We use 1998 financial data to calculate the interest coverage ratio and *Z*-score since the full impact of the crisis was not reflected in 1997 financial statements. We concentrate on interest coverage and the *Z*-score because of the extensive prior evidence relating these variables to financial distress.

To analyze the effect of the various types of debt on financial performance, we estimate regressions with performance measures as dependent variables and the debt components as predetermined independent variables. We also include other independent variables to control for some additional factors other studies have suggested may affect performance, such as the percentage of debt that is long term, foreign EBIT and cash, firm size, and dummy variables for a foreign equity listing, a family affiliation, country, and industry. The first column of Table VI shows results of the estimation using excess equity returns during the crisis year as the dependent variable. As expected, debt levels, regardless of type, have a significant negative effect on a firm's equity return during the crisis. Of more interest is the relative magnitude of the regression coefficients on the debt variables. Contrary to the conclusions of prior research, FC debt use is not related to significantly larger declines in equity value than those associated with NLC debt

[23] Several commentators, including U.S. Federal Reserve Chairman Greenspan, suggested that the crisis was due at least in part to a "panic" by investors.

Table VI

Financial Performance around the Asian Crisis

This table reports results from OLS regressions with measures of equity market and financial performance as the dependent variables. Excess equity return (column 1) is defined as the holding period return for each company in the sample minus the domestic market index holding return. The equation is estimated for the crisis period (June 28, 1997 to June 26, 1998). The second column (2) shows results from using interest coverage in 1998 as the dependent variable. The third column (3) shows results from using the Altman modified *Z*-score in 1998. Independent variables included as levels are from 1996. Debt variables are the (predetermined) debt-to-value ratios. Dummy variables are included for all countries (in place of a constant) and for one-digit SIC industries but not reported to conserve space. Independent variables are defined in detail in Appendix A. Coefficients (Coef.) and heteroskedasticity consistent standard errors (*SE*) are reported.

	(1)		(2)		(3)	
	Dependent Variable = Excess Equity Return (6/1997 to 6/1998)		Dependent Variable = Interest Coverage (1998)		Dependent Variable = Modified *Z*-Score (1998)	
Variable	Coef.	*SE*	Coef.	*SE*	Coef.	*SE*
Natural local currency debt	−0.343**	0.150	−13.514***	2.221	−8.391***	1.159
Foreign currency debt	−0.415**	0.200	−12.940***	2.967	−8.786***	1.470
Synthetic local currency debt	−1.202***	0.410	−17.576***	6.127	−12.478***	3.047
Long-term debt percent	−0.040	0.072	−5.455***	1.084	−1.547***	0.549
Foreign EBIT (% value)	1.295***	0.521	26.613***	7.815	9.102**	3.846
Foreign cash (% value)	−0.078	0.420	5.337	6.298	4.244	3.178
Sales (log, USD)	0.070***	0.021	−0.005	0.311	−0.029	0.155
Foreign equity listing	0.118**	0.050	0.381	0.745	0.184	0.369
Family affiliation (Dummy)	0.083	0.052	−1.266	0.780	−0.125	0.389
Number of observations	316		318		310	
Adjusted R^2	17.2%		55.1%		69.2%	

*** and ** denote significance at the 1%, and 5% levels respectively, in a two-tailed test against a null of 0.0.

(i.e., the coefficient of −0.415 for FC debt is not significantly different from the coefficient of −0.343 for NLC debt).

A surprising result reported in the first column of Table VI is the large negative coefficient on synthetic local currency debt. The value of −1.202 is significantly more negative (at the 5% level) than either the coefficient for NLC or FC debt. Contrary to our expectations, this suggests that foreign debt hedged with currency derivatives (i.e., SLC debt) is associated with a substantially *greater* decline in market value than either natural local currency or unhedged FC debt. This counterintuitive result is likely due to developments in the derivatives market for EA currencies during the crisis. Anecdotal evidence indicates that liquidity

in the foreign exchange derivatives market dried up during the currency crisis.[24] For example, several EA countries went so far as to temporarily discourage or prohibit the writing of derivative contracts to deter attacks by speculators. If risk from foreign currency debt is hedged by factors such as foreign EBIT and foreign cash reserves (as suggested by our prior results), the synthetic local currency debt likely represents the foreign debt that is exposed to a currency depreciation before hedging with derivatives. In this sense, SLC debt may measure the marginal exchange rate exposure of foreign debt if firms were unable to keep their hedges in place. The inability to roll over hedges effectively converted the synthetic local currency debt back into foreign currency debt. The collapse of the derivatives market was public knowledge; hence, it could easily have affected equity prices during the crisis.

Some hard evidence also suggests that the breakdown of the derivatives market during the crisis affected the ability of firms to roll over their derivative positions. Bank for International Settlements (1999) data show that countries in EA had virtually no swap transactions in 1998 with maturities greater than 1 year. However, 73% of firms' foreign currency debt had a maturity of greater than 1 year in 1997. This highlights the probable maturity mismatch between foreign currency debt and available derivative products, which would expose firms unable to roll over their hedges during the crisis. Data on the actual hedging practices of our sample firms are also consistent with this conclusion. For 1997, data are available for 67 of the 70 firms that hedged in 1996. Of these 25 (37%) decrease their percent hedged and 7 (11%) increase their percent hedged; the average percent of foreign debt hedged falls from 65.8% to 49.1%. For 1998 we have data on 39 of the 70 firms that hedged in 1996: 32 (82%) decrease their percent hedged and 3 (8%) increase their percent hedged; the average percent hedged falls drastically from 58.6% to 14.9%.

Table VI (column 1) also shows that firms with more foreign EBIT, larger firms, and firms with a foreign equity listing perform significantly better during the crisis.[25] This last result is consistent with the findings of Mitton (2002) regarding the affect of ADRs on returns. Finally, there are not significant differences across countries or industries after taking into account the firm-specific explanatory variables. The evidence is generally consistent with equity markets reacting

[24] For example, the TMA Journal (1999, p. 43) reported: "During periods of extreme volatility, liquidity in Asian currencies evaporated, making the cost of hedging astronomically high . . . liquidity dropped to record low levels, as indicated by the widening of the bid–offer spread. For the rupiah, the spread widened to 40 percent, from pre-crisis level of 1 percent, pointing to the existence of a one-sided market (as everyone rushed to hedge against the depreciating Asian currencies)." See also, Bradbury (1999, p. 23). Finally, our discussions with dealers confirm the lack of a liquid currency derivatives market during the crisis.

[25] Several explanations can account for this. First, the previously noted risk management benefits that foreign EBIT provides to foreign currency debt users should increase a firm's ability to weather the crisis. Second, foreign currency cash flow from outside EA appreciated in local currency terms, so even firms without FC debt could benefit from a high percentage of foreign EBIT. Finally, firms with significant export business became more competitive (when compared to non-EA firms) after the currency depreciations.

Table VII

Operating Performance around the Asian Crisis

This table reports results from OLS regressions with measures of operating performance as the dependent variables. The change in log sales (column 1) is defined as the difference between 1996 and 1998 in the log of sales measured in U.S. dollars. The second column (2) shows results with the change in operating margin between 1996 and 1998 as the dependent variable. The third column (3) shows results from changes in net investment from 1996 to 1998 using net property, plant, and equipment (standardized by sales in 1998) as the dependent variable. Independent variables included as levels are from 1996. Debt variables are the (predetermined) debt-to-value ratios. The variables representing changes in sales and operating margin are calculated as differences from 1996 to 1998. Dummy variables are included for all countries (in place of a constant) and for 1-digit SIC industries. Independent variables are defined in detail in Appendix A. Coefficients (Coef.) and heteroskedasticity consistent standard errors (*SE*) are reported

	(1)		(2)		(3)	
	Dependent Variable = Change in log Sales (1998–1996)		Dependent Variable = Change in Operating Margin (1998–1996)		Dependent Variable = Change in PPE/Sales (1998–1996)	
Variable	Coef.	*SE*	Coef.	*SE*	Coef.	*SE*
Natural local currency debt	0.000	0.187	− 0.069	0.056	0.008	0.178
Foreign currency debt	0.541**	0.250	− 0.028	0.075	0.655***	0.237
Synthetic local currency debt	− 0.869*	0.515	− 0.268*	0.155	0.309	0.490
Long-term debt percent	0.125	0.091	− 0.015	0.027	0.074	0.086
Foreign EBIT (% value)	1.189*	0.657	0.149	0.198	− 0.832	0.624
Foreign cash (% value)	− 0.313	0.530	− 0.101	0.159	0.104	0.504
Sales (log, USD)	− 0.109***	0.026	0.006	0.008	− 0.069***	0.025
Foreign equity listing	0.090	0.063	− 0.003	0.019	0.024	0.059
Family affiliation (dummy)	0.018	0.066	− 0.004	0.020	− 0.045	0.062
Number of observations	318		318		317	
Adjusted R^2	30.3%		19.7%		32.8%	

***, **, and * denote significance at the 1%, 5% and 10% levels respectively, in a two-tailed test against a null of 0.0.

rationally to the currency depreciations, insofar as factors expected to influence returns frequently do and the signs are as predicted.

The second and third columns of Table VI report results with the interest coverage ratio and the *Z*-score as dependent variables. Qualitatively the results are similar to those for equity returns. Each type of debt has a significant negative influence and foreign EBIT has a significant positive effect. The overall fit of these regressions is high, with adjusted *R*-squareds of 55.1% and 69.2%, respectively. For both regressions, the magnitudes of the coefficients on debt types are statistically indistinguishable, suggesting that each debt type had a similar impact on financial performance. This result has two important implications.

First, the result for synthetic local debt contrasts with the previous result using equity returns as the dependent variable. This may be because the 1998 accounting data fails to reflect the long-term effect of the depreciations or the equity market initially overestimated the impact of the derivative market failure on the financial performance of firms with SLC debt.[26] Second, and perhaps more surprising, these results do not support both anecdotal evidence and conclusions of prior research indicating excessive use of foreign debt as a primary culprit in the Asian financial crisis (at least for nonfinancial firms). To the contrary, the evidence suggests that foreign debt had roughly the same impact as local debt on market and financial performance. Implicitly, firms appear to have done reasonably well in determining appropriate levels of FC debt relative to local debt by considering risk management tools such as foreign EBIT and cash reserves.

It is also important to examine if and how the operations of firms were affected by each type of debt. For example, prior research finds that financially distressed firms lose customers, get less favorable terms from suppliers, are forced to discount products, and reduce new investment to below the optimal level (see Altman (1984), and Opler and Titman (1994), among others). Following prior researchers, we conjecture that changes in sales reflect changes in the customer base. Changes in the operating margin capture less favorable terms from suppliers or a need to discount products. Finally, changes in net property, plant, and equipment reveal changes in investment policy.

Table VII reports results from tests examining the effects of each debt type on different aspects of operating performance. These regressions also include industry and country dummy variables, but the coefficients are not reported to conserve space. In general, the impact of debt on operating performance appears rather limited. Results in the first column suggest that firms with relatively more FC debt tended to experience an increase in sales during the Asian crisis. As with the findings reported in Table VI, this is contrary to suggestions that FC debt was associated with underperformance. The positive coefficient on foreign EBIT is consistent with a positive effect of the devaluation for firms with foreign revenues. Finally, the negative coefficient for SLC debt (significant at the 10% level) is consistent with prior evidence suggesting the differential adverse effect of SLC debt.

The second column of Table VII repeats the analysis using changes in operating margin around the crisis as the dependent variable. In this case, the only significant relation is the weak negative effect of SLC debt (again consistent with the prior findings). Results in the third column of Table VII reveal a positive relation between FC debt and changes in net PPE, our proxy for changes in investment. This finding is consistent with the prediction of Bris and Koskinen (2002) that prior to a depreciation, exporting firms will underinvest due to the debt overhang

[26] It was widely believed by market participants in the beginning of 1998 that further currency depreciations could lead to a spread of the political unrest seen in Indonesia and a further weakening of equity markets. Since derivative markets were a less viable alternative for hedging against exchange-rate movements, equity prices probably adjusted to include a risk premium related to the chance of additional currency declines.

problem, but once a depreciation occurs, these highly levered firms will undertake foregone investments. Overall, these results are akin to the findings of Andrade and Kaplan (1998) that financial distress costs are probably small even for highly levered firms.

To make sure the results presented in this section are robust, we also examine other specifications not reported here. As noted, we use fiscal year 1997 instead of 1998 accounting data. In general, we feel that 1998 data are better because the full operating impact of the crisis is not felt until the latter half of 1997, and for most firms, financial conditions continue to deteriorate in 1998. Nevertheless, it is possible that firms' accounting results are significantly different for 1997, but then reversed in 1998. Repeating the tests in Tables VI and VII using dependent variables calculated using 1997 data leads to results similar to those reported. We also examine additional measures of financial performance, such as the current ratio and quick ratio, and obtain similar results. In only one test do we identify a significantly larger effect for FC debt. In this test, we define a dummy variable that identifies firms with an interest coverage ratio greater than 1.0 in 1996 and less than 1.0 in 1998. In a LOGIT estimation, levels of FC debt were significantly better than levels of natural local debt at identifying these firms. Assuming this finding is not the result of data snooping, it provides evidence that firms with FC debt were more likely to go from not being distressed pre-crisis to being distressed post-crisis.

Another concern, especially regarding the performance results for SLC debt, is endogeneity. Specifically, firms with a higher chance of distress or greater exposure to exchange rates, regardless of the mix of debt type, might be more likely to use SLC debt. For example, managers may know that financial distress is relatively costlier for their firm (in a dimension we do not measure) and therefore hedge exchange-rate risk, or FC lenders may identify high-exposure firms and require the bundling of exchange-rate derivatives with an FC loan. We conduct two types of tests to assess if endogeneity drives our performance results. To conserve space, the results of these tests are not tabled but are available from the authors upon request.

First, we examine univariate statistics for 1996 to determine if variables related to financial exposure are significantly different for SLC users and nonusers. We inspect our measures of business risk, size, growth opportunities (market-to-book), asset tangibility, the modified *Z*-score, interest coverage ratio, current ratio, quick ratio, and percentage of long-term debt. When comparing SLC debt users to all nonusers, the only differences (significant at the 5% level) are that SLC debt users have more long-term debt and more tangible assets. Comparing SLC debt users only to other firms with foreign currency debt reveals that SLC debt users have significantly higher market-to-book ratios, modified *Z*-scores, interest coverage ratios, and long-term debt (all at about the 5% confidence level). With the exception of the difference in market-to-book ratio, these findings suggest that SLC debt users likely have a *lower* unconditional probability and costs of financial distress and typically are *less* financially constrained than nonusers prior to the crisis. Yet, this latter result may also be endogenous if riskier firms with higher expected costs of distress allow for additional financial slack.

As a second and more rigorous test, we control for endogeneity in the performance regressions by employing a two-stage least squares technique. Instead of using the actual debt levels as explanatory variables, we use the predicted levels from the simultaneous equation estimation described in Appendix B. With some minor exceptions, the results from this process are nearly identical to those reported.[27] Together, these tests suggest that endogeneity is unlikely to account for our findings.

C. Exchange Rate Risk and the Magnitude of Market Declines

The Asian crisis had both a financial and an economic dimension. In this paper, we concentrate on the former, although the two are closely related. For example, some prior research has suggested that the financial crisis was fundamentally due to excess capital investment in certain industries. When economic activity (and, hence, the return on capital) slowed, this precipitated the financial crisis, which in turn exacerbated the region's economic problems. Other researchers have suggested that excessive foreign currency debt was at the root of the crisis (see Mishkin (1999), among others). Our foreign debt data allow us to shed light on this debate. For each firm, we calculate the portion of market value decline attributable to the increase in net foreign debt liabilities during the crisis. Specifically, we estimate the increase in net foreign financial liabilities in local currency terms by taking the level of unhedged foreign debt minus foreign cash reserves (each measured in USD) in 1996 and multiply by the change in the USD exchange rate during the crisis period. We then divide this value by the change in stock market capitalization. The resulting figure represents the percent of market value decline associated with the increase in the local currency value of net foreign debt during the currency crisis. If the Asian crisis were a purely financial event and had no underlying impact on operating profits or risk, we would expect the values to be roughly 100% since the only impact of the currency depreciation would be an increase in foreign currency financial liabilities. To the extent that the crisis also had an economic impact (e.g., lower sales, financial distress costs, greater equity risk premiums, etc.), then the values should be less than 100%. Alternatively, values significantly less than 100% could suggest that the equity markets overreacted to a primarily financial crisis.

For the 166 firms with foreign currency debt and not located in Hong Kong and China (since these countries' currencies did not depreciate against the USD), we find that the increase in net foreign financial liabilities accounts for 37.0% of the decline in equity market value of EA firms. Hence, the majority of the decline in market value of EA foreign debt users cannot be directly attributed to an increase in net foreign financial liabilities. Furthermore, these values probably

[27] All of the coefficients on the debt variables retain their signs and significance with the following exceptions: In column 1 of Table VI, the magnitude of the coefficient for SLC debt is reduced so the difference from the other debt levels is significant only at the 10% level. In column 1 in Table VII, the coefficient on SLC debt is no longer significant. In column 2 of Table VII, the coefficient on NLC debt becomes significantly negative at the 10% level, and the coefficient on SLC debt changes from being significant at the 10% level to the 5% level.

overestimate the contributions to declines since we do not attempt to correct for the increase in the present value of subsequent cash flows in foreign currency (i.e., foreign EBIT). However, values vary significantly across countries. For the two high-income countries, Singapore and Taiwan, the value is low, averaging only 10.9%. In the middle-income countries, the average reported value is 42.9%, though the values range from a low of 6.8% in the Philippines to a high of 80.5% in Indonesia.

Interestingly, not all EA firms with FC debt have a net exposure to a depreciating local currency. Of the 166 firms, 12 (7.3%) have foreign cash reserves exceeding the value of unhedged foreign currency debt. By including a rough estimate of the increase in the present value of foreign EBIT,[28] the number of firms with an effective long position in foreign currency increases to 62 (37.3%). Overall, from this analysis, we conclude that the majority of the decline in market value of EA firms during the Asian crisis was due to factors beyond the increase in foreign financial liabilities. This result is also consistent with the prior findings that FC debt was not significantly more likely to lead to market or financial underperformance than local currency debt.

IV. Conclusions

In this study, we examine the use of different types of debt for a large sample of East Asian nonfinancial corporations. Our analysis concentrates on two general questions. First, what firm-specific, country-specific, and industry-specific characteristics determine the use of local (both natural and synthetic) and foreign currency debt? We find several unique factors, as well as some common factors, that determine the use of different types of debt. For example, proxies for the (perceived) lower cost of foreign currency debt and the need for accessing deeper foreign capital markets consistently explain the type of debt used by EA firms. In addition, the use of foreign currency debt is tempered by the ability to manage the associated currency risk with risk management tools, such as foreign cash flow and cash reserves. Asset type is also important for the use of FC debt, consistent with an agency theory of costly monitoring. Finally, synthetic local currency debt use appears to be motivated by a different set of factors than natural local currency debt, which is primarily related to risk management theory.

The second question we address concerns the relation between type of debt and performance during the Asian crisis. Contrary to the conclusions of prior research, we find no evidence suggesting that unhedged foreign currency debt was the primary cause of poor performance during the crisis. However, firms' use of synthetic local (i.e., *hedged* foreign currency) debt is associated with significantly worse stock market (and perhaps operating) performance—a result explained by evidence related to derivatives market illiquidity during the crisis, which forced many firms to leave their positions largely unhedged.

Our findings have several important implications. First, nonfinancial firms with adequate natural hedges (e.g., foreign EBIT) may be able to support substan-

[28] We capitalize future foreign EBIT assuming zero growth from 1996 and a 10% discount rate.

tial levels of foreign currency debt even when there exists a significant risk of a currency crisis. In a similar vein, local and global financial institutions (e.g., central banks, the IMF, etc.) should construct emergency plans for stabilizing the foreign exchange derivatives market in times of crisis. While it is debatable whether or not equity markets overreacted to the Asian crisis, the declines in firm value greatly exceeded the increase in net foreign financial liabilities resulting from the devaluation. This implies that policy makers' efforts are well placed when concentrating on structural economic issues as opposed to considering purely financial remedies. Our results can also help international borrowers and lenders understand the role different types of debt play in overall capital structure and potentially facilitate the process of financial intermediation in the foreign currency debt market.

Finally, we propose some avenues for future research suggested by our analysis. First, other researchers such as Leland (1998) have modeled the relations between agency costs, risk management, and capital structure. Our results suggest that this framework could be expanded to include a choice of debt currency type and constraints (or differential costs) on local currency lending markets. In particular, the relation between financial (traded) and business (nontraded) risk in local and foreign markets could be formalized to make more precise predictions. Second, while we are careful to control for potential effects related to debt maturity, the theoretical and empirical relations between currency denomination of debt and optimal maturity structure are largely unexplored.

Appendix A. Definition of Variables

Much of the data is acquired from SBC Warburg Dillon Reed (SBC-WDR) from the *Valuation Issues—Reality Check* series published by the Asian equity research group. The primary purpose of the reports we use is to determine the foreign currency debt exposure of East Asian corporations. Some of these data are collected by direct contact with the firms in the sample. The studies' authors, Orgill and Lee (1999), note that,

> We also highlight that for Asian corporates in general disclosure is poor and transparency low. It is difficult to be confident as to the level of hedging of foreign debt that has been undertaken. Where in doubt we have taken the view to record the debt as still unhedged, which we think is an appropriate and conservative approach (p. 3).

The following reports variable definitions, the primary data source for the variable or its underlying factors, and any other relevant considerations for all variables reported in one of the tables.

Variables

Asset Tangibility: Total assets minus current assets standardized by total assets. Assets values are from WorldScope. We have also utilized an alternative measure for asset tangibility defined as net plant and equipment divided by total assets.

This alternative is highly correlated (Pearson correlation coefficient of 0.642) and yields very similar results to those reported using the primary measure.

Average Tax Rate: Income tax paid divided by pretax income. For negative or extreme values, we truncate the variable at 0 (6.4% of observations) and 0.5 (4.3% of observations).

Business Risk: Defined as the standard deviation of *operating margin* in the years 1996 to 1998. As alternative measures we used the standard deviation of *sales* (indexed to 1996 levels) in the years 1996 to 1998 and the change in the *operating margin* from 1996 to 1998. These measures also lead to generally insignificant coefficients for *Business Risk* and had little effect on other results.

Committed Capital Expenditures: As reported by SBC-WDR for the next 12 months. Each value is standardized by dividing by *Sales* as reported by WorldScope.

Debt-to-Value: Total debt in USD as reported by SBC-WDR divided by *firm value*.

Equity Index Returns: As reported by DataStream including distributions for primary local equity indices: Hong Kong/China: Hang Seng Index; Indonesia: Jakarta Composite; Malaysia: KLSE Composite; Philippines: PSE Composite; Singapore: Strait Times Index; South Korea: Seoul Composite; Thailand: SET Composite; Taiwan: Taiwan Weighted Index.

Excess Equity Returns: Excess equity returns are individual equity holding period returns minus equity market index returns.

Family Affiliation (Dummy): Variable is set to a value of one (zero otherwise) if the company is identified as affiliated with a family-related cross-holding structure.

Firm Value: Calculated as market value of common stock plus market value of preferred stock plus book value of total debt (in USD or local currency as specified).

Foreign Cash: As reported by SBC-WDR. Cash held in foreign currency measured in USD. Also used as a percentage of *firm value*.

Foreign Currency Debt: Total foreign debt as reported by SBC-WDR times one minus *Hedge (%)*. Value is standardized using *firm value*.

Foreign EBIT: As reported by SBC-WDR. Total earnings before interest and taxes (EBIT) earned in foreign currency (measured in USD). Also used as a percentage of *firm value*.

Foreign Equity Listing (Dummy): Variable equals one if the firm trades on a stock exchange not in its country of incorporation and zero otherwise. This includes firms with American Depository Receipts (ADRs) and Global Depository Receipts (GDRs).

Foreign Sales (%): As reported by the Asian Company Handbook for 1996. Many of the firms in our sample are not listed in the Asian Company Handbook. For these firms, we collected geographical segment data when available. If a firm did not report geographical segment data or reported geographical segment data for only its home country, we set the variable equal to zero. Consequently, our measure of foreign sales may underestimate the actual level of foreign sales.

Hedge (%): As reported by SBC-WDR. The percentage of foreign debt hedged with foreign currency derivatives. The SBC-WDR reports do not give a detailed

explanation of this variable. From our discussions with the individuals responsible for collecting the data, this value represents a best estimate of the notional value of all foreign currency derivatives used to hedge foreign debt regardless of type or maturity. As discussed in the main text, long-term debt was frequently hedged by rolling over short-term derivative positions.

Industry Dummy Variables: SIC codes are as reported by WorldScope for 1996. Dummy variables are set to a value of one if the first digit of the primary SIC code corresponds to the respective dummy variable.

Interest Coverage: Data are from WorldScope and are calculated as total EBIT divided by interest expense. Because some firms have very low interest expense or negative EBIT, we truncate the series at 0 and 10. For the full sample in the years 1996 to 1998, 10.3% of observations are truncated at 0 and 17.8% are truncated at 10.

Interest Rate Differential: The difference between local short-term lending rates as reported by the World Bank and LIBOR in December 1996.

Long-term Debt Percent ([FC-LC]): Nominal debt values for local and foreign currency and short-term and long-term (greater than 1 year to maturity) debt are from SBC-WDR. To calculate the ratio of long-term debt to total debt, we use the exchange rate provided by SBC-WDR to convert all debt to local currency terms and then sum by maturity type. To calculate the difference in long-term debt percent [FC-LC], we first calculate the ratio of long-term debt to total debt for local and foreign currency separately, then take the difference between these values. For firms without any foreign currency debt, we set this variable equal to zero. Alternatively, for firms without foreign debt, setting the variable equal to the mean for firms with foreign currency debt does not significantly affect our results.

Natural Local Currency Debt: Local currency debt values are from SBC-WDR. Value is standardized using *firm value*.

Market-to-Book: Market value of equity divided by book value of common shareholders' equity defined as total assets less total liabilities less outstanding preferred stock. Data are from WorldScope. We truncate this variable at 10 due to two outlying observations (0.6% of sample).

Miller Gains-to-Leverage: Defined as $1 - (1 - \text{Corporate Tax Rate}) * (1 - \text{Equity Income Tax Rate})/(1 - \text{Interest Income Tax Rate})$. Tax rates are obtained from the International Tax Summaries: A Guide for Planning and Decisions, Coopers & Lybrand International Tax Network, George J. Yost, III, Editor. We use the highest marginal capital gains rate as the Equity Income Tax rate. Values for the countries in our sample are as follows: Hong Kong, -0.044; Singapore, -0.043; Taiwan, -0.250; Indonesia, 0.350; South Korea, 0.595; Malaysia, -0.030; Philippines, 0.350; Thailand, -0.111.

Change in Net PPE/Sales: Data are from WorldScope. Calculated as the difference in net property, plant, and equipment in 1998 from 1996 divided by *sales* in 1998.

Operating Margin: Operating income divided by *sales* as reported by WorldScope. When used in changes, we take the 1998 value minus the 1996 value.

Sales: Total revenues as reported by WorldScope. When reported in USD, we use the exchange rate from WorldScope. When used in changes, we take the log-difference from 1996 to 1998.

Synthetic Local Currency Debt: Calculated as total foreign debt multiplied by *Hedge (%)*, which are both from SBC-WDR. Standardized using *firm value*.

Z-Score: Calculated using the formula provided by Altman (2000):

$$Z\text{-Score} = 6.56 * X_1 + 3.26 * X_2 + 6.72 * X_3 + 1.05 * X_4$$

where
X_1 = (working capital)/(total assets)
X_2 = (retained earnings)/(total assets)
X_3 = EBIT/(total assets)
X_4 = (book value of equity)/(book value of total liabilities).

Appendix B. Technical Issues and a Simultaneous Equations Specification for Debt Type

The specification of tests for the determinants of debt type are complicated by two general factors. The first relates to debt-to-value ratios having a point mass at zero for firms with no debt of a given type. The second and more challenging issue is the endogenous variables problem related to the various types of debt.

To address the limited dependent variable problem we chose a TOBIT specification. The primary alternative to this one-step estimation is a two-step procedure (see Heckman (1976)) with separate equations for the decision to issue a debt type (e.g., a PROBIT) and the extent of use of a debt type for only those firms using that form of debt (e.g., OLS). The log-likelihood specification test for choosing between these two models generally favors the TOBIT specification. One limitation of the TOBIT model is the relatively strong assumptions needed to obtain consistent estimates. We test the assumptions of normally distributed underlying disturbances and heteroskedasticity using Lagrange multiplier statistics (see Greene (2000)). In the results reported in Table III, and subsequently in this appendix, we cannot reject null hypotheses of homoskedasticity and normality at the 5% level.

We examine the more important issue of endogeneity by considering simultaneous-equation specifications that include other types of debt as determinants. However, even stronger assumptions are needed for this analysis. For example, we assume that all other nondebt variables are exogenous to the system. While this is probably not the case (e.g., anecdotal evidence suggests committed capital expenditures could depend on obtaining foreign currency funding), it is unwieldy to treat more of the variables examined as endogenous. Similarly, if we extend the analysis to some nondebt variables, it is not obvious which ones should be included in this set. An additional challenge comes from choosing the appropriate specification and estimation technique for a simultaneous-equation system with limited dependent variables. We chose to estimate a simultaneous-equation TOBIT model using the two-stage estimation procedure suggested by Nelson and Olson (1978). We are cautious about results from these estimations and inference, since the finite sample properties are not well known in the presence of various types of model misspecification, and an analysis of these properties is beyond the

Table BI

Determinants of Debt Type (Simultaneous Equation Estimation)

This table presents results from a two-stage simultaneous-equation analysis. The dependent variable is the value of the type of debt described divided by firm value in 1996. Fitted values of other debt types from a first stage estimation are included in the estimation. Other independent variables are defined in detail in Appendix A. One-digit SIC dummy variables are also included in the estimation. Coefficients (Coef.) and standard errors (*SE*) are reported. The estimation for synthetic local currency (column 3) includes only firms with foreign debt, since this is a precondition for synthetic local currency debt and excludes South Korean firms that are prevented by law from using derivatives (and therefore synthetic local currency debt).

	Dependent Variable: Debt-to-Value Ratio					
	(1)		(2)		(3)	
	Natural Local Currency Debt		Foreign Currency Debt		Synthetic Local Currency Debt	
Variable	Coef.	*SE*	Coef.	*SE*	Coef.	*SE*
Natural local currency debt			0.781*	0.444	−0.298	0.529
Foreign currency debt	0.071	0.133			0.654***	0.263
Synthetic local currency debt	−0.351***	0.045	0.407**	0.189		
Average tax rate	0.087	0.074	−0.156*	0.096	0.193	0.120
Asset tangibility	0.031	0.051	0.014	0.084	−0.022	0.106
Business risk	0.032	0.064	−0.076	0.121	−0.010	0.138
Sales (log, USD)	−0.002	0.009	0.045***	0.010	−0.034**	0.014
Operating margin	−0.131**	0.064	0.065	0.099	0.068	0.135
Market-to-book	−0.030***	0.005	−0.036***	0.007	0.008	0.009
Foreign equity listing (dummy)	−0.005	0.019	−0.055**	0.023	0.038	0.031
Committed Capex/sales	0.008	0.013	0.054***	0.014	−0.011	0.021
Foreign EBIT (% value)	0.143	0.205	0.781***	0.261	−1.294**	0.645
Foreign cash (% value)	−0.083	0.162	0.484***	0.181	−0.232	0.250
Family affiliation (dummy)	−0.022	0.020	0.001	0.024	0.008	0.031
Long-term debt percent (FC-LC)	−0.035	0.033	0.160***	0.032	−0.131***	0.049
Miller gains-to-leverage	−0.025	0.083	0.155	0.096	0.123	0.128
Interest rate differential	−0.657*	0.402	1.703***	0.539	−3.175***	0.931
Intercept	0.175	0.125	−0.591	0.143	0.457	0.055
Number of observations	315		315		162	
Left censored	34		138		96	

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, in a two-tailed test against a null of 0.0 using a Wald chi-squared test.

scope of this paper (see Amemiya (1974, 1979) and Flood and Tasiran (1990)). An encouraging result is that different specifications do not seem to have a strong effect on the size or significance of most of the estimated coefficients.

We present here results from the simultaneous-equation estimation (see Table BI), so that we can discuss the relations between different types of debt, and second, as a robustness check for our results reported in Table III. In the natural local currency debt equation we find a significant negative relation with synthetic local currency debt. This confirms, as intuition suggests, that the two types

of debt are likely substitutes. The use of FC debt does not explain the use of NLC debt. In this specification, the significant negative coefficients on operating margin and market-to-book are preserved. However, the coefficients on size, foreign cash, the Miller gains-to-leverage, and long-term debt percent are no longer significant at conventional levels. This suggests that the previously estimated relations for these variables may be spurious and instead related to the use of other types of debt.

In the foreign currency debt equation, we find significant positive coefficients for both NLC and SLC debt. These are consistent with the theory and prior evidence that FC debt users are constrained by local currency capital markets and use FC debt as a complement to LC debt. Other coefficient estimates are largely similar to those in Table III, with a few exceptions. In this specification the coefficient on the average tax rate is positive and significant at the 10% level, while asset tangibility is not significant in this specification.

In the synthetic local currency debt equation, the coefficient on FC debt is positive and significant. This is generally consistent with risk management theories suggesting that firms with more foreign currency debt are, ceteris paribus, more likely to need to hedge the foreign exchange risk associated with that debt. Otherwise, coefficient estimates are again similar to those reported in Table III. One exception is the negative coefficient on long-term debt percent (FC-LC).

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